

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

SEPT. 26, 1955

50 CENTS



Another town is safer tonight because these trained civilian members of the Ground Observer Corps are scanning the skies to warn against possible enemy attack. But all over America there are many areas, perhaps your own, that do not have this protection because the G.O.C. is seriously understaffed.

In extending its vital work to all 48 states the Ground Observer Corps needs many thousands of new observers. You'll find the G.O.C. both interesting and exciting! A few hours a week of your spare time will help keep your home and country safe. Volunteer today...contact Civil Defense!

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Through the assistance of the Ground Observer Corps, the U.S.A.F. Air Defense Command is prepared for any alert with aircraft such as the Convair-built F-102A all-weather supersonic interceptor.





Douglas VC-124B powered by four 2550 h.p. Pratt & Whitney T-36 turboprop engines.

How the Holley "hidden co-pilot" does two jobs with one handle control

Throughout the entire operational range of the new Douglas VC-124B, engine power and propeller power settings must be precisely coordinated. This has always been a "two handle" job but in this new airplane the job is done with a single control lever and the help of a Holley Power Control which functions like a "hidden co-pilot". One of these controls installed on each 5520 horsepower Pratt & Whitney Aircraft T-36 engines automatically senses altitude, air temperature and speed and feeds

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FOR
PNEUMATICS



The words "Kidde" are used by the firm and are indicative of Kidde, Kidde & Company, Inc.

25th Anniversary of the "Sky Girls"

This year marks the 25th Anniversary of airline stewardess service, which started back in 1930 when eight women first started flying for Boeing Air Transport, a direct ancestor of United Air Lines. Today, United employs more than 500 stewardesses, chosen from thousands of applicants and trained at United's school in Chicago, Wyoming. Approximately 15,000 stewardesses are now flying for air lines throughout the world.



Four air stewardesses in 1930, eight San Francisco women were assigned to the national Boeing 80-A which carried 14 passengers at cruising speed of 130 miles an hour.

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W. A. Portman, President of United Air Lines, with Ellen Church Gird, the world's first stewardess, and Lily Doyle Bender, national President of United's Stewardess Association.



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FACTS

about

NEW DEPARTURE

BALL BEARINGS



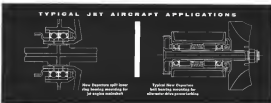
Research develops aircraft bearings for extreme speeds and temperatures

With jet aircraft flying higher and faster than ever before, ball bearings are being called on to meet increasingly severe conditions. For example, bearings that support the turbine wheels are subjected currently to temperatures up to 800° F., at high speeds and heavy thrust loads.

Anticipating still greater demands in the future, New Departure's Aircraft Research Program is already developing bearings for operational speeds of over 100,000 rpm and temperatures running up towards 1000° F.

Typical of the bearings used in jet engines are New Departure's split inner ring types. These bearings are giving satisfactory performance in production engines today at extremely high speeds and heavy thrust loads. Write for full details.

New Departure split inner ring bearings are separable, facilitating cleaning, inspection and assembly into the engine. They carry heavy thrust loads from either direction and will also support major radial loads.



New Departure split inner ring bearing assembly for jet engine mainshaft

Typical New Departure ball bearing assembly for turbine drive power turbine

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NEWS DIGEST

Domestic

Eastern Air Lines plans to announce this week an overall re-equipment program for turbine-powered vehicles when a company meeting at New York. Eastern will place large orders for Lockheed's turbo-prop Electra and for the Douglas turboprop DCS. Lockheed spokesmen anticipate that Eastern's Electra order will be larger than the 15 plane order placed by American Airlines. Eastern will buy the Allison Model 501 turboprop engine for the Electra, following American's lead in placing a \$12,500,000 order last week for the Allison prop-jet. National Airlines also is planning to Electra-DC-8 fleet (AW July 11, p. 165) but has not yet placed firm orders.

Seaboard & Western Airlines and BOAC have entered into an indefinite air cargo agreement to expedite air freight deliveries over both carriers' routes through the use of one newly built. S&W's recently made a similar agreement with Aerolineas Azules for trans-Atlantic cargo service (AW Sept. 10, p. 161).

Lockheed Electra turboprop transport aircraft and wing flap will be made by Teneco Aircraft Corp., Del. Inc. Ten, with fast delivery scheduled for late 1956. Teneco will handle design testing and fabrication of the components. Electra work represents Teneco's first commercial subcontract.

Ryan Aeronautical Co., San Diego, Calif., will build aircraft components for Canada B-52 supersonic bomber under a contract totaling more than \$100,000.

Prototype Douglas DC-74 all-weather conversion by Canadair Ltd. Wings has made its initial flight in a probe to 25 hr flight check of structure and special seats and engine equipment. Canadair has a USAF contract calling for conversion of 50 DC-74s to all-weather status.

Fairchild C-82B aircraft transport has completed accelerated service and is in possession of 39th Troop Carrier Group (Fixed Wing) at Aitah main AFB, Okla. during which the plane ran 1600 hr in less than two months. Purpose of trial was to compare C-119 operational data, supply requirements and train flight and ground crew.

Radio training for 1,735 United Air Lines pilots began last month. Course



Grumman Produces New Navy Trainer-Transport

Design, means facilities between the new TBF-1J, trainer transport version of Grumman S2F scoutfish and its derivatives. This new airplane does not carry the adjustable belly radome, magnetic anomaly detector (MAD) boom and underwing overnight of its combat counterpart. A number of TBF-1J already in service with Navy. Plans pictured show carrier arresting hook, indicating that it is intended to work from carriers as well as Navy shore bases.

Cloud weather mapping equipment includes home-made and classroom work. UAF, began installation of \$2.5 million in RCA radar this past season.

Seaplane U. S. S. Santeago is scheduled to be christened Oct. 8 at the N. Y. Naval Shipyard, Brooklyn. A 90,000-ton seaplane in the U. S. S. Forrestal, Santeago is slated to be commissioned early and year. Her construction began in December 1952.

Navy and Marine Corps officials recently made a 44-min flight in Lockheed C-130 Hercules turboprop-powered transport at Marietta, Ga., where the plane is in production for USAF. Vinton was James F. Lee, assistant to the Navy's Assistant Secretary (Proc), Lt. Col. G. E. Lambert, Baker and Maj. W. H. Rademacher, USMC, Baker.

Capt. Harold T. Bartlett, USN, et al., who were unaccompanied at night to the airport from Norfolk, Va., in Panama Canal Zone in a PV-10 flying boat in 1930, died in San Francisco. He was 68.

Aerolineas & Mivale Systems Laboratories has been selected by Boliviana de Aviacion, Inc. at La Paz, Bolivia. New 120,000-square-foot headquarters will attract 700 technicians for research and development in radio, communications, communications and missiles. The latter function previously had been performed at Spruce's Whitehouse N. Y. facility.

Colonial C-1 Skyway three-propeller amphibian has been granted Type Certificate (A1) by Civil Aeronautics Administration. Powered by a 150-hp Lycoming 5120 piston engine bearing a constant speed Hartzel propeller, the C-1 has a top speed of approximately 125 mph. It will sell for about \$16,000 with VHF radio and standard flight panel. Dealer is Colonial Aircraft Corp., Deer Park, L. I., N. Y.

Financial

Capital Airlines reports a July net profit of \$112,580 and operating profit of \$318,990. Total operating revenues for the month: \$4,776,684. Passenger revenues totaled \$4,201,672. Capital flew 237,064 passengers, 71,651,975 passenger-miles in July compared with 223,672 passengers down 70,616,652 passenger-miles in July 1954.

International

New aircraft carrier, Midland Air Line, has been found in Zurich, Switzerland, using Carver C-4s and Lockheed Constellation. The C-4s will be assigned to ferry various European points to state where lands will be transferred to Constellation for an airport abroad.

Belgian air agreement has been signed permitting Air Lines to fly from Dublin to Brussels and beyond in exchange for Belgian trans-Atlantic rights at Shannon Airport. Airlines of both countries also are allowed to open direct services between their capitals.

Today and Tomorrow...



CANADAIR COUNTS — in Guided Missiles

Grin behind the push-button war, the guided missile's development has become an urgent matter for all world powers. The missile itself is not enough... the race is now for sharper control, greater speed, higher altitudes, more sensitive response.

In the interests of national security, this program is naturally classified but we can say this much: we are working closely with Canadian government research agencies, in the advanced technological fields of design, development and construction of guided missiles. We have produced inside airplanes and control equipment... have seen them through actual firing tests.

This is a challenging field, where Canadian engineers face and overcome new problems every day. In missile development, as in other fields of aeronautical achievement, people who know say, "you can count on Canada."



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can air

AVIATION CALENDAR

- Sept. 1950—Radio Technical Conference for Aeronautics, full assembly, Hotel Statler, Washington D.C.
- Oct. 1-5—Electronic National Electronics Conference, Hotel Sherman, Chicago.
- Oct. 4-6—Eleventh annual Aircraft Spark Plug and Ignition Conference sponsored by Champion Spark Plug Co., Hotel Hotel, Toledo, Ohio.
- Oct. 5-7—National Business Aircraft Assn., eighth annual Meeting and Dinner, Statler-Cadille Hotel, Detroit.
- Oct. 5-7-1951 National Airport Conference, sponsored by American Association of Airport Executives and University of Oklahoma, Norman, Okla.
- Oct. 5-6—World Plastics Fair & Exposition, National Guard Armory, Los Angeles.
- Oct. 7-8—Engineless High Performance Aircraft Symposium sponsored by Institute of Transportation & Traffic Engineering, Inc., at U.C.L.A., Aeronautical Engineering Assn., Institute of the Aeronautical Sciences, 345 Building, Los Angeles.
- Oct. 11-14—National Convention of State Aviation Officials, annual convention, Dallas.
- Oct. 14-15—Speech of Automotive Engineering Golden Anniversary Aeronautical Meeting, Aircraft Production Forum and Aircraft Engineering Display, Hotel Statler, Los Angeles.
- Oct. 19-19—Eleventh annual Naval Design and Spinning Conference, sponsored by the Washington State Aeronautics Commission and the State College of Washington, Wenatchee, Wash.
- Oct. 17-21—National Safety Council, 43rd National Congress and Exposition, La Salle and Conrad Hotels, North Chicago.
- Oct. 17-21—International Air Transport Assn., 11th annual general meeting, Waldorf Astoria Hotel, New York.
- Oct. 20-21—Sixth annual National Noise Abatement Symposium—Aircraft Research Foundation, Chicago.
- Oct. 24-25—Symposium of Radio Engineers Professional Group on Electronic Devices, 4th annual Technical Meeting, Sheraton Hotel, Washington, D.C.
- Oct. 25-27—Industrial Conference on Aircraft Electrical Applications, American Institute of Electrical Engineers, Hollywood Roosevelt Hotel, Los Angeles.
- Oct. 26-28—Sixth American Airport Managers Assn., annual meeting, Greenville S.C.
- Oct. 27-28—Navy's Electrical Society, 12th annual dinner, Fort Pacific Auditorium, Los Angeles.
- Oct. 30—Eleventh annual Tokyo Aviation Day, Tokyo, Japan.
- Oct. 31-Nov. 3—Institute of Radio Engineers, 1951 East Coast Conference on Aeronautical and Navigational Electronics, Lord Baltimore Hotel, Baltimore.
- Nov. 3-4—Institute of the Aeronautical Sciences and Canadian Aeronautical Institute, annual annual joint meeting, Chateau Laramie, Ottawa, Ont., Canada.
- Nov. 3-4—National Airlines Trade Association, annual convention, Hotel Westwood Inn, Phoenix, Ariz.
- Nov. 4-11—Aeronautical Management Society, 19th annual basic system study, management clinics, Hotel Sherman, Chicago.

MONOGRAM SHEET METAL CLAMPS

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INDUSTRY OBSERVER

(Editor's note: This column was written by Aviation Week's staff attending the SBAC flying display at Farnborough and covering the British aircraft industry.)

►Vee and Saunders Roe interceptors, powered by combined turbojet-turbofan powerplants, are scheduled for first flight within next few months. Saunders-Roe design will use high test pressure in a decompression cycle for its intake control, layout of the plane follows a delta wing.

►Grosz Jettie, new turbojet developed by de Havilland is a half-thrust model of its massive Gnome (AW Sept. 29, p. 15) appears to be a prospective powerplant for production versions of some of the projects now entering flight in the drawing boards. Suggested customers for the 6,000 lb. thrust Gnome Junior include the Saunders-Roe and Vee interceptors.

►Performance of Aero Vulcan has exceeded requirements of contract by substantial margins, approaching near speeds in level flight at extremely high altitudes. But Aero designers, who had hoped to push plane into the super-sound speed area, are disappointed. Design is limited by aerodynamics of thick wing. To thin the wing would (for the delta form) require a complete redesign of the major portions of the engine. Current maximum performance at altitude is apparently limited by availability of elevator control.

►Recent Olympus-Gambrel altitude record of 65,576 ft. set by Bristol's Whistler Gals (AW Sept. 12, p. 11) did not show absolute limit of the design. Gals had a couple of hrs. left between stall and compressibility, when he stopped climbing. He loaded with approximately 50 gallons of fuel in the tanks.

►Vickers Viscount replacement design is still not finished. Argument over engine around wing location. Some decisions in BBA prefer low wing because of passenger acceptance of the Elancaster. Others favor low wing in front. Viscount doesn't rise but significantly needs an immediate decision from BBA.

►Fancy BTD 2 delta aircraft now is pointed toward understanding of problems of maneuverability at high altitude and speed. Specific parts of its flight research program will be devoted to study of intercepting supersonic bombers.

►Gross weight of DH 110 is present production configuration is 35,000 lb. Airframe cost is a few pence at less 50 m. cannon. Like the Hawker Hunter, the pack can be worked out of the airplane in a cut for fast arrival and take-off. Detailed development of plane will be as a multi-launcher.

►English Electric P.1, designated as a long range interceptor, is limited by fuel capacity to the job of target defense. Development of the aircraft is expected to progress from current powerplant of turbo-Supersonic turbojet twin Avon ultimately to a single Gyron.

►Thunder two water development is aimed at an all-weather fighter with performance superior—though not by a big enough margin—to the Gladius [see p. 10]. Hurdles and official sources are not sure about the design, hope it will be taken for a trial. But the plane that was demonstrated at Farnborough had a large painted arrow on left hand side of nose, labeling the solar cooling connection.

►Rolls-Royce vertical takeoff projects, not to be confused with the company's "wing bedstead" which is simply a control test rig, are just Anglo-American efforts. Rolls-Royce is believed to be based on the use of standard Saur turbojets.

►Rolls-Royce RB 109 turbojet is now in its last major design modification, and now design is that the engine is finally built and have little resemblance to the designs that were presented to the aircraft industry about one year ago.

WHO'S WHERE

In the Front Office

►Percy M. Goshall, vice president, industrial relations, Pan American World Airways.

►John H. Seligman, vice president, Eagle Banking, Los Angeles.

►David Dornier, vice president and chief engineer, Whittle Laboratories, Inc., Great Neck, N. Y. Frank H. Williams, assistant chief engineer.

►Rear Adm. Harry B. Temple (USN Ret.), current vice president of Kalamazoo Pulver Co., Coopers Co.

►Harry B. Brown, Jr., credited to the vice president of Panavia Helicopter Corp., Meriden, Conn.

►Jack C. Vidler, vice president of H. K. Allen.

Honors and Elections

►Walter L. Rott, president of Reynolds Metal Corp. and vice president of Reynolds Metals Co., appointed by Sen. of the Indiana Douglas McKay to serve on the Indiana Advisory Committee on Aeronautics.

►Roger Winkler of Wm. H. Engineering Co. appointed chairman of the Investment Control, Industrial Metal Specifications Committee. V. R. Lippert of Gering Progress, Inc. appointed chairman of the Progress Planning Committee, George C. Mason, Jr. International Progress Committee.

Changes

►Victor J. Corbin, manager of the personnel and directed research dept. at Ames Research of Ames Institute of Technology.

►William M. Best, chief of aircraft and missile section, Control Engineering Co., Denver.

►John F. Norcia, manager of flight operations development, Delta, Oak Park, Ill.

►James R. Cope, civilian relations manager for Douglas Aircraft Company's Long Beach Division.

►A. E. Rosner, Jr., chief of operations services at Northrop Aircraft's Palmdale Air port facilities. Col. M. Paul W. Williams, assistant Washington representative. Roy D. Gardner, project engineer on new Northrop long range interceptors.

►Ralph F. Fenn, industrial administrative division, department of Denney Corp., Chicago.

►Delroy Moore, manager engineering services, Sparta Electronics Inc., Sparta, Wisconsin. Co. Jackson, Mich. Bert Aiken, engineering staff.

►Neil A. Ross, application engineering project, Vickers Inc., Detroit.

►John Artifice, assistant chief of research in performance design at Fairchild Aircraft.

►John T. Baker, general manager, Northrop Inc., transient manufacturing, factory in Phoenix, Ariz. appointed by Wm. H. E. Williams, director of research and development. Edward G. Brown, product production manager.

►Andrew B. Brown, New York City director sales manager of Sikorsky Aircraft.



Genuine Hamilton Standard reversing Hudsonian propellers are being furnished for the new Douglas B4-36 "Seven Seas" mothers. Years of marine experience, the highest engineering skills and unsurpassed modern facilities in Island ship propellers, and other best line of equipment which Hamilton Standard is producing for jet and piston-engined aircraft.



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(Left to right, from top to bottom: McDonnell F-101, North American F-100, Convair F-102A, Boeing B-52D, North American A-1A, F-86, and F-84, Lockheed C-124, Douglas DC-7, Sikorsky HO4S and HO4C.

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any other structural metal... and one that can be fabricated by normal shop practices. In hundreds of really tough applications working else will do the job as well as titanium.

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Washington Roundup

Airline Hiring Conference

The Eisenhower Administration is getting set to extend its policy of barring discrimination in hiring for government contract work to the nation's airlines.

The President's Committee on Government Contracts—headed by Vice President Richard Nixon—is preparing a conference with airline officials to explain federal rules which ban discrimination against minority groups by contractors dealing with the federal government. The federal-industry labor committee favors placing such a clause in government-industry contracts.

Before the committee recommends such action, however, it wishes to advise the industry's executives of its determination to eliminate hiring bias in airline positions. In the meantime, which has not yet been decided, the committee will emphasize that it has no power to penalize violators of the anti-discrimination clause and that it solely volunteers support.

The contract committee approved the idea of a can-do force after receiving complaints from the Urban League in New York that Negroes were barred from jobs as pilots, flight engineers and attendants. At present, a committee side visit, a "bribe" of Negroes have been hired to ticket airlines and as maintenance work but that, in general, Negroes do not hold airline jobs that are in contact with the public.

The airline conference, one part of a series of future committee sessions on hiring discrimination in the entire transportation industry. Initial plans are to meet separately with industry and union leaders to explain the committee's purpose prior to action that will extend anti-discrimination clause to transportation contracts.

All government contracts of \$10,000 and over include an anti-discrimination hiring clause, with the federal contracting agency authorized to cancel the contract with violators. However, this enforcement power has not been used by the Eisenhower Administration.

Purpose of the Nixon committee is to side lend on these agencies' past practices of violations and to work compliance through the agency and the contract not by pressure methods. But, before extending the clause to transportation industries, the group wants to explain why the Administration is doing so and the results it hopes to achieve.

All Flights IFR?

After earlier public air traffic control or 100% instrument flight rules in some metropolitan areas is getting increasing attention from air line pilot groups. Chances predict that air line management will soon be faced with pilot demands to make it a matter of company policy to fly with IFR in high density areas.

The Pilot's Master Executive Council at one of the major trade unions has just on record with a resolution in favor of implementing 100% IFR air traffic control at New York, Chicago and Washington, D.C. Command board in recommending such action included:

- The visibility factor in today's air carrier aircraft is about 5%.
- The cockpit-to-cockpit closure rate of some of today's aircraft is less greater than the speed of a 45 cal. Colt automatic bullet.
- The congestion of air traffic has reached the proportions where the New York center alone, in one 24 hour period last spring, closed 4,600 individual IFR aircraft.

• The aviation industry will never be strong enough not to be scared by the idea it would accept from the public's station to a sudden radio-calls over some major city.

Air Power Debate

The air supremacy issue still is being tossed back and forth in Washington and seems certain to stay there long enough for what Sen. Stuart Symington (D-Md.) fears USAF Secretary, generals will be a "one-way square." Most recent flurry was caused by a columnist's claim that the Defense Committee report, now in the hands of the White House and the National Security Council, warns Russia is winning the air supremacy contest and will be on the front sector 1955. The report brought a prompt statement from President Eisenhower's press secretary that it was "inaccurate," adding that the President alone will decide what parts of the report, if any, will be released to the public. Symington's reaction was to demand that the Defense Department tell the people the truth, adding he would press next time to find out "why there is a current effort to further their cause as defense expenditures while the Congress is not in session."

Progress Payments

Defense Department's proposed revision of the progress payments clause in government contracts will get close attention in Washington this week. According to Committee Chairman of Armed Services Asia.

Purpose of the revision is to limit progress payments to 75% of total cost and 90% of the value of direct labor and materials. In addition, it is designed to assure that the government has title to all parts, materials, equipment, work in process, tools, etc. This is included to help aircraft manufacturers light load efforts in non capital equipment and inventory that do not represent complete investment.

The latest amendments have been in effect for several months. The previous revision, extended to industry by the Defense Department has concerned will stand under the clause. The Pentagon has asked for comments not later than Oct. 10.

\$80 to Seattle?

Sen. Warren Magnuson (D-Wash.), boss of key position as chairman of the Senate Commerce Committee is campaigning for the state law as coach fare to the Pacific Northwest as applied to transcontinental service to California-Northwest line. His committee has scheduled hearings on the matter for Oct. 10 and Oct. 11, in Seattle. In addition to Magnuson, Sen. John Baucus (R-Gro.) and Sen. Charles Porter (R-Mich.) are expected to attend.

Northwest Airlines is considering expanding, and possibly adding routes, for coach service to the Pacific Northwest, but fairly certain of one change at the \$160 fare. "Let's not let ourselves," a Northwest Airlines spokesman said, "the traffic to the Pacific Northwest is only about 9% of that to California." Civil Aeronautics Board members have had overheard with Northwest and United Air Lines officials about reducing coach fares to Seattle and Portland, but there are no concrete developments.

—Washington Staff

Gardner Defends Greater R&D Spending

Pushes request for \$200-million more now to keep pace with Russian guided-missile gains.

By William Gough

Los Angeles—Trevor Gardner, USAF Assistant Secretary for Research and Development, last week vigorously defended the additional \$750 million he wants from Congress despite administration pressure for a balanced budget.

Gardner also warned that "hundreds of millions of dollars" more will be needed if the U. S. is to keep pace with the Soviet Union in the guided-missile field.

Speaking before the full meeting of the American Rocket Society and clearly still at the recent talk of increasing its defense appropriations, Gardner admitted that R&D expenditures are "in combat" with the budget. Then he warned:

"The most complex and baffling technological mystery today is not the Russian capability to develop and use nuclear weapons but rather what the 30-year program has been in the field of guided missiles."

"This means people a great deal of concern, and it makes our use we have to have large sums of money for guided missiles."

The double-edged warning was not at the most significant, open against defense cuts by administration officials since the beginning of Russia's "space

door" policy. And he went one step further by telling the delegates to the meeting:

"As a responsible officer of your government in charge of our Air Force research and development program—I wish to state that it is not the intention of this administration to lose our technological lead over Russia in order to merely balance the budget."

"We all know," he added, "that it is necessary to keep a balance, and we need \$700 millions more now, to work on the problems I have just been talking about. (The problems he had just been talking about were those of guided missiles, complexity and reliability.) He continued:

Willingness to Expend

"We must be willing to expend increasingly larger amounts of our national resources—both in dollars and technological effort—on our efforts in the development of guided missiles."

This means, in addition to other things, additional hundreds of millions of dollars for research and development."

Gardner then reviewed a plan for increased R&D spending which he made known a month ago at the Air Force Association meeting in San Francisco. It is not generally known that Gen.

Kimball and the Pentagon

Los Angeles—David Kimball, president of Austin Guaranty Corp. and former secretary of the Navy, is an advisor to the American Rocket Society last meeting last week without one of the difficulties of doing business with the Pentagon.

- "You take as much as more about than you get from conventional contractors."
- "The time to get a contract is two times as long."
- "You are outbalanced, overpaid and overworked around until you wish you had never seen the place."

not transparent but San Francisco speech considerably only a few hours before it was to be delivered after he, learned that Donald A. Quisenberry had been appointed Secretary of the Air Force by the administration.

Leaders all at the time that Gardner had planned a harsh indictment of present R&D efforts but changed his mind at the time of the meeting when Quisenberry, a Defense Dept. research and development expert, was named to the top Air Force post.

In his talk last week, Gardner described:

"They made an excellent choice in selecting an outstanding man as Secretary of the Air Force Quisenberry."

Quisenberry Stead

And his speech echoed in more dramatic and eloquent terms a policy already announced by Secretary Quisenberry (Aug. Sept. 15, p. 152) who had a great deal of experience on the Columbia Broadcasting System network, television shows that, "We should not lose direct our program to build up a most modern and efficient air force."

Quisenberry indicated that defense spending might be cut in noncritical areas to help administration officials balance the budget but emphasized he would oppose any cuts that might hamper the military's present accelerated growth program.

As Secretary Gardner left little doubt that attempts to cut defense spending would also drive down the level of his office but he also indicated that he would be in the front line in such a fight when he emphatically declared:

"Those of us who are charged with

the management of the national investment in guided missiles are constantly caught in the dilemma of attempting, on the one hand, to report to you on the progress we are making while on the other hand, of avoiding the sad reality repeating might pay to our potential enemies. It is this looking for a goal link with a reality."

Adm. Radford Warns Red Air Gains Startling

The report with which Soviet Russia has developed long range jet bomber forces and atomic weapons "in one of the most startling technological military gains of our time," in the opinion of Admiral Arthur Radford, chairman of the Joint Chiefs of Staff.

Addressing an Atlantic City meeting of the National Petroleum Assn., Admiral Radford stressed that Soviet scientific, technological and production skills in the military field have revealed the country from the position of a satellite power that a world shattering World War II.

After the war, he said, the United States declined while the Russians "became a new kind of super power—a technological one to perfect superior weapons systems. Then, at rapidly as possible, they began turning out these weapons in quantities."

These developments, Admiral Radford said, have resulted in a total contrast for the United States and "our whole future depends on winning it."

The top military commander of the White House attributed Russia's progress to a very heavy investment of her available scientific and technical skills. "He said there have been millions in improving their resources to achieve military power."

Of major significance, he said, is the stress placed on forcing young Communists into technological centers, forming the well-trained scientific force as fast as the United States.

"Our technological leadership in these major fields is being seriously challenged," Admiral Radford said.

"We have held the lead in scientific and technological progress, but our lead inevitably will be whittled away unless we correct these major trends."

The United States still is ahead of Russia, he said, but that conclusion is tempered by the knowledge that the trend is the other way.

"There is always the grave possibility," he added, "that the Soviets could develop atomic, advanced weapons."

They might do it, he said, even though not as advanced technologically as we are through a tremendous outpouring of their efforts.

At Helicopter Forum

Gas Turbine Monopoly Predicted

Los Angeles—New gas turbine engines are under intensive development now achieve a new monopoly of the helicopter field within a few years, military and industry experts predicted last week.

Reports on these new engines have led the two-day Western Forum of the American Helicopter Society.

Development of the new engines in developing an XT55 gas turbine for helicopter use came as a Navy paper. The latest release said a few days earlier of information on the Licensing XT55, noted at S15 by (Aug. Sept. 15, p. 177).

The Licensing XT55, designed by the Air Force and Army, is rated at 1,650 hp twice that of the XT35. Presumably like the XT35, it will be adaptable to helicopter use and as a turboprop for fixed wing aircraft.

Cody R. B. "One of the U. S. Navy Helicopter Section said the Navy has been able to helicopter components designed for the use of gas turbine engines and turboprops."

"No reciprocating engine development of major importance is planned to meet these installations," he said. "The best power turbine type of engine obtained, often more advantage when applied to helicopter and will be used in all cases except those in which an engine developed for both fixed and rotary wing applications."

They reported that the Navy's development of a gas turbine engine for the General Electric XT55 engine.

Second Turbine Drives

New interest is centered in gas turbine engines. The Navy is now testing a test drive such as the Allison T38-A2 test compressor engine being planned on a research and development basis only, without extensive thought being given to a production program," he said.

The Navy is pushing gas turbine engine development for helicopters on a close approach to a general outlook for application to a general outlook.

In other words, they said, rather than determine the requirements of a given type of helicopter and then develop an engine to meet the need, effort should be directed in developing an engine to meet the particular requirements of the prospective power system.

This approach for the helicopter gas turbine should extend from 1,600 to 1,800 shaft horsepower, he declared. "The major step in this direction, though not as advanced technologically as we are through a tremendous outpouring of their efforts."

admirable progress between 300 horsepower and 750 horsepower, and between the T35 and 1,000 horsepower." These and "We believe that these gains should and will be shared."

D. D. Wolfenden of the Army Transportation Section said it appears that for the majority of helicopter applications the free turbine turbo-prop engine offers the greatest potential. But, he added, the Army believes that as long as the general requirement of long life with a minimum of maintenance and simple repair is met, "it does not make any difference as to the type of engine, whether it is a reciprocating engine, gas turbine, rotor tip burner or any other type."

Wolfenden said a major part of the Army power plant development program is devoted to engine research of various engines. He listed projects to develop shaft plug design, increase shaft life, improve vibration of induction and air transport piping and components.

Among new developments, he mentioned investigations of the principles of exhaust ejector cooling, hot jet pre-heating development for cold starts, fuel systems, automatic carburetors, heat exchangers, automatic controls for the combustor and new air filter media.

Trial Installation

D. C. Boley of General Electric and his colleagues said that the advantages of light weight, fuel consumption comparable to reciprocating engines, lower fuel cost, reduced vibration, lower maintenance and improved reliability.

They said that the Navy's development of a gas turbine engine for the General Electric XT55 engine. The Navy is now testing a test drive such as the Allison T38-A2 test compressor engine being planned on a research and development basis only, without extensive thought being given to a production program," he said.

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Douglas Weapons System Policy

Los Angeles—The philosophy of Douglas Aircraft Co. as applied to the guided missile field was outlined last week before the American Rocket Society by Donald Douglas, Jr., vice president of the company.

He said the Douglas Co. believes the role of the missile manufacturer should be that of "supplier" of the weapon system and builder of the missile.

"It is our view that some of the leading missile companies have moved into the guidance and propulsion fields," Douglas said. "They believe, actually, that there are advantages to be gained by this. We happen to believe it is better to leave each work to companies whose experience and facilities best qualify them to do the job."

"The Douglas attitude with that competition with suppliers or potential suppliers cuts off the first three of alternatives that is essential in producing the best possible choice of the various elements involved."

"In the first place," he said, "the work of the guidance system specialists is absolutely basic. We at Douglas believe that best results are obtained by working with them, instead of moving into their field. Anytime anyone is loose to do anything else, but we have never been in the business of manufacturing them."

"As to the preference of suppliers, we believe that in some instances, while it is best to let others do whatever phase of the job they are best qualified to do."

Congress Threatens Investigation Of AF Communications Contract

Washington—House Appropriations Committee investigators last week started a probe of an Air Force program to spend \$2.4 billion with private industry to upgrade the air defense system.

The money would be paid out over two years to Western Electric Co. and American Telephone & Telegraph Co., to provide a communications network known as SAGE, to link remote radar stations with control centers to direct planes and missiles against enemy raiders.

Some Democrats claim they are looking for a scandal involving the Defense Department and big business, charging that USAF had been deceptive and secretive in making arrangements for the contract. The Air Force replied that no serious congressional groups had been advised of the project and details disclosed at hearings before appropriations committees.

USAF let the first award with the contract on Aug. 30 to John W. McCoskock, ID Man 1, for General Joseph Campbell had blocked the deal on the grounds that Congress had given no authority for a long-term commitment. The Air Force actually was prepared to appeal and said that the Campbell-Gossett's office had agreed to reconsider. Campbell's decision dated Aug. 15, writes no money

can be spent on the SAGE project at this time.

It was pointed out that the communications network had been approved by the National Security Council, headed by the President, as vital to the security of the nation.

McCoskock, who was not questioning the need for the system, but the propriety of letting it pass private companies instead of having it built by the government.

He believed and the contract would be a bonanza for big business because the two firms would still own the circuits after collecting \$2.4 billion over the next several years.

In his dissenting Congressional dissent Campbell acknowledged that the question had been discussed at hearings before Congress, but the "congressional committee" he regarded as establishing congressional approval or authorization for undertaking and financing the extensive new communications program.

USAF replied that Congress already has appropriated substantial funds for acquisition of infrastructure, construction of facilities and procurement and installation of equipment.

The extensive new telephone net is needed to coordinate operations from a centralized complex equipment for a system capable to report warnings from radar stations.

Royal Gull Certificated

Civil Aeronautics Administration is now the first type certificate for a biplane aircraft built in U. S. standards for an ultra long-range amphibian built by Eagle.

Design efforts were presented the certificate by Henry W. Weeks, CAA engineering director, who was in Italy in an official tour (AW Sept. 5, p. 79). The amphibian will be marketed in the U. S. by the Royal Aircraft Corp. of Milwaukee, Wis., as the Royal Gull.

AMC to Take Over Far East Logistics

Command of the Far East Air Logistics Force will be shifted from Far East Air Force to Air Materiel Command Oct. 1. The change will give AMC responsibility for USAF assets at Tachikawa, Japan, and Manila, as well as procurement, supply and maintenance centers in the Pacific and Far East.

Next step in the growing world-wide shift of AMC activity will be transfer of current responsibility in the European theater. Details will be worked out later this month by a team scheduled to visit headquarters of USAF in Europe at Wiesbaden, Germany.

The new operational plan requires the highest responsibility of AMC. They already include direct military support to the Alaska, Northwest, Sprock and Caribbean Air Commands.



Airlines Personnel Get 707 Check Flight

With representatives from four U. S. airlines aboard, the Boeing 707 jet transport prototype took off from Boeing Field, Seattle, on a two-hour demonstration flight. The airline personnel, all members of the Society for Aeronautical Engineers' committee on safety standards, included Carl M. Christensen and W. E. Rensel, United Air Lines; M. G. (Tex) Frost, American Airlines; Capt. M. Blake Gahle, Northwest Airlines; and one observer with A. M. (Tex) Johnson, Boeing's chief of flight test and Capt. Steve Plover, Pan American World Airways. Budd stated that the 707's cockpit opens with SAE standards. Plans to carry streamlined Boeing flying boom for air-traffic scheduling time.

Convair B-58 Contract to be First To Include Profit-Penalty Clause

Los Angeles—The U. S. Air Force contract to acquire point-to-point missiles for the Convair B-58 bomber will be the first to include a profit-penalty clause.

The new contract, which was a critical "groundwater" to convince approval USAF and Congress now are negotiating a test contract with the Air Force. The provisions for penalties on performance and delivery schedule (AW Sept. 19, p. 12). The new B-58 contract will be the first step in a series of contracts to incorporate these in fixed-price contracts.

Question as the current USAF negotiations with the San Diego manufacturer is a change in specifications to use in establishing performance standards.

Air Force specialists previously had approved Convair's performance figures for the new delivery bomber as being too optimistic and produced their own figures to prove their point.

General Johnson, the Air Force chief, believes should be used in setting up the required performance parameters while USAF wants to use the same optimistic Convair figures.

North American Position

Meanwhile, another manufacturer, who did not wish to be quoted, decried the AMC policy statement as a "propaganda stunt" to gain favor with the military. USAF, he asserted, has shown the ability to produce contractors who failed to live up to performance specifications and delivery schedules.

North American Aviation declined official comment on the new policy, but it is known that top NAA officials have felt for some time that USAF should take stronger measures to punish those who fail to live up to promises made in design competition.

More than two years ago, J. L. Alford, NAA president, recommended financial penalties for firms whose planes fell to short specifications.

Alford said at the time that there is a need for "business realism" in procurement and no longer "a disproportionate premium attached to winning a design competition."

Increased Competition

He called for action by both the Air Force and Navy, adding, "In the position of financial penalties for the mismanagement of performance guarantees is the only realistic answer, then I believe such penalties should be invoked."

Lockheed Aircraft Corp. and Northrop Aircraft Division declined to comment officially on the policy outlined by Maj. Gen. David H. Baker, AMC Director of Procurement and Production.

A Northrop spokesman pointed out that company president, Walter C. Sullivan, has stated many times that he "is well aware of the competitive nature of our business, and it goes without saying that on new facilities would be created under a thorough and unbiased survey showed clearly that similar capable facilities did not exist in private hands."

Others Healed

Others also heeded the Baker statement as a move to increase competition and incentive.

"Anything that increases incentive is good," declared a high Convair official.

"The idea has fundamental merit," he pointed out that there will be difficulty in administering such a policy in regard to such unknown factors as new equipment and maintenance testing.

It was pointed out that in such areas, where the performance parameters change most, "Will a company be willing to gamble a half-billion dollars knowing that 5% off the desired performance over several years will mean real wipe out of profit?"

Donald Douglas Jr. and the Douglas Co. from the idea of more severe performance penalties and believed it will result in more realistic design competition.

Production Policy

It must be limited to production time, however, the Douglas' vice president said. "You cannot apply this to research and development or it will kill interest in R & D type projects," he warned.

Convair's manufacturer pointed out that in most cases a single bid effective penalty procedure should be in effect for delivery to meet performance specifications and delivery dates. "Now that the award manufacturer takes his subcontract elsewhere."

Small defense firms greeted enthusiastically the news from AMC that government-financed tools and buildings are a thing of the past. The last time one of the latter came at the subcontracting level.

SDIA Appeals More

The Small Defense Industries Association is submitting a petition to the AMC now.

"We have few differences with the major contractors," Paul Caschubian,

SDIA director and president of Des Moines Co., told Associated Press, "but the government facility question has been a sore point with many of us for a long time. In the past, many government facilities have been involved and awarded one or two large contracts even though identical equipment and capacity was already available in private hands."

"We feel that national security demands a strong national industry but the top management of major companies is often unaware of the situation created by this condition," he said.

Caschubian pointed out that SDIA members are not in a position to keep track on new facilities would be created under a thorough and unbiased survey showed clearly that similar capable facilities did not exist in private hands.

So the role of the Air Force has made a move toward step toward increasing competitive economy through its new policy," he concluded.

Eastern Reaction To Policy Mixed

Washington—Reaction of East Coast industry representatives to USAF's new policy on increased performance and delivery penalties was mixed.

One major engine manufacturer hailed the decision as "what we have been advocating for years."

It was a specific case of an important aircraft company. "If the industry is forced to assume more responsibility at least be compensated with more profit and then left alone and not hampered by government officials."

"Poor performance," this executive said, "can be the result of many things besides a company's own mistakes. There are developments beyond a company's control that come about because the time a design is bought and production can be started."

Another major jet representative said, "We agree on punitive action if it can be made a risk." The spokesman said there is a constant danger that the congressmen will outdistance the manufacturers and that the results will be unfair.

It was also pointed out that penalties have been imposed in the past, but the rule was not enforced across the board.

Among industry leaders, the question was raised of the standards used to judge how well a new manufacturer lives up to its scheduled performance.

The new was cited of the Convair F-102, designed according to the title of the set before development of the military contract by the National Aeronautics and Space Administration (AW Sept. 12, p. 12). Modification of the design to the F-102A on one more



TWELVE SUPER SABRES of the 479th Fighter Day Wing, 4th USAF Tactical Air Command wait to receive the supersonic flight, days by its own George AFB, Calif. F-100's now calling off production lines are sure about lookback.

faults following the NACA development made it possible for the plane to achieve supersonic performance.

Would performance in this case, it was asked, be judged before or after the area rule improvement was incorporated in the design.

Aircraft engineers, manufacturers pointed out their delays, schedules, upon which USAF will place greater emphasis, can be spent by such agencies as the failure of C-141A (government furnished aircraft) equipment to arrive on schedule. During these delays, USAF still sometimes finds it changes the conditions that have been experienced in the field.

The new has been cited at a plane now in production where the engine is furnished by the government. After the aircraft was on the launch line, USAF changed engines, applying a power seat that weighs 500 lb more than the one that was called for in the original design.

The company also finds that the new USAF policy of eliminating design studies and avoiding concerns that go through Phase 1 to a small number of private firms, is too restrictive.

Other design organizations argued themselves in favor of stricter demands from USAF but were skeptical of statements that competition will be achieved by recent procurement policy changes.

The Aircraft Industries Assn declined comment.

Defense to Limit Contractor Payments

Defense Department on Oct. 1 will forbid payment of more than 105% of the costs incurred on incentive-type and price-rebate-type contracts, prior to completion of a final price.

Defense directive (41657) was the purpose is to eliminate the need for substantial rebates by contractors after attractive final determination of price.

Actually, the purpose is viewed by Pentagon observers as twofold:

- To stop the practice of companies

that collect more than three percent in worth and invest the extra money pending the government's price determination.

- To help balance the budget, as part of the Defense Department's effort to save more than \$750 million from estimated 1966 expenditures.

There also was a report that the Pentagon is working on a program to speed up price determinations.

The new Defense directive calls for a 105% limitation due to be written into all new contracts. In addition, contracting officers are to cancel the payments within that amount in administering existing contracts.

Russia Views X-1A

Russia's popular press has lately recognized the existence of high-speed American experimental aircraft but, in their way of explaining, the plane no nothing to create Soviet designers' ideas. As an example, Zvezda-Sila (Knowledge is Strength), a weekly scientific and technical magazine for young Soviet scientist workers, recently published a picture of the Bell X-1A with the following caption:

"The experimental Bell X-1A rocket plane has achieved a speed of 2,096 kilometers per hour in a dive. This is more than twice the speed of sound. The craft has attained a maximum altitude of 27 kilometers."

"However, the Bell X-1A is unable to take off from the ground by itself. It is carried to a great height by a speed airplane. When the rocket plane is launched and then is shut, burning up its entire fuel supply in several minutes."

It should be noted that the errors are only such conditions as are recognized by experts.

(Editor's note: The Bell X-1A actually achieved the speed of 3,636 kilometers—1,630 mph—in a climb, not a dive as reported by Zvezda-Sila.)



NORTH AMERICAN F-100 heads into steep climb (above) . . .



WHILE POLK often hit supersonic speeds over desert.

TAC Flexes New Super Sabre Muscle



TWO LONG ROWS of F-100 Super Sabres stand along final assembly line at North American Aviation's Los Angeles plant. The second TAC unit to receive the planes is the 479th Fighter Day Wing, of Fort Worth, Texas.

'No Show' Penalty Fee Dropped For Domestic Coach Passengers

Washington—The domestic scheduled airlines have killed the "no show" penalty fee on air coach services. It was a consumer action by the Air Traffic Conference but could have no influence for "competitive reasons" on the part of a minority group of airlines.

Abandoning the air coach no show penalty is seen as a direct contradiction of the efforts to develop a "no show" penalty system for first class air services (AW Aug. 22, p. 11).

The decision to drop the fee plan for air coach passengers holding seats

others who either fail to show or cancel too late to refill the space now first caused by a majority of the carrier members of the Air Traffic Conference, and later made unanimous. The action is formerly effective Oct. 2 but the unanimous tariff changes filed with the Civil Aeronautics Board do not take effect until Oct. 15.

The "no show" penalty previously in effect imposed a charge of 25% of the unit air coach fare with a maximum charge of \$4. It was designed as a corrective measure for the continued abuse

of the airlines reservation system. A proposal for extending a comparable system to first class flights has long been under consideration. Inability of the carriers to agree on a single, uniform plan for assessing penalties has precluded implementation of an industry program.

C. R. Smith, American Airlines' president, announced at the convention with the statement: "Experience clearly indicates that no single carrier or minority group of carriers can effectively operate a system designed to discourage abuse of the reservation system if all other carriers refuse to do so."

American has been a vigorous proponent of the use of penalty charges as a means for relieving the traffic problem of "no shows" and late cancellations. Once the ATC voted to cancel penalties on coach service, Smith only cited the decision as a letter to CAB stating that American's insistence "is due to competitive forces."

Smith observed that "the continuing abuse of the reservation system by the public is primarily the fault and responsibility of the air lines . . . for the existing system which permits, and at least indirectly encourages, abuse of the reservation system is one devised by the air carriers and continued with their approval." He said that a penalty system to discourage abuse of the space reservation procedure is an essential element of the public service the airlines are expected to provide.

Smith told the Board he felt that there should be no distinction in general reservation policy at between the air coach passenger and the first class passenger. He accused those who advocated abolishing the penalty system for air coach of being against the public interest. Rather, it would be in the public interest to impose a like action on first class services, Smith said.

Douglas Shifts

George B. Goff, Douglas Aircraft Washington representative for the past eight years and assistant secretary in connection to the general office in Santa Monica, Calif., where he is scheduled to be named secretary of the company.

E. F. Tollefson, new corporate vice president and director of contracts, has been appointed as the Washington representative.

Edward Curtis, former assistant director of contracts, has been named director of contracts. H. R. Blythe of the Douglas Washington office has been assigned assistant project engineer in the DDC-40 aircraft program. His replacement is S. W. Cybulski, who was formerly with the military aircraft staff located at the Santa Monica headquarters.



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New Propeller For Supersonic Flight

Hamilton Standard's new nose mounted, low blade tip subsonic propeller designed to operate through the subsonic and supersonic speed ranges, will be used on the F-4B Phantom II supersonic fighter which will power the Douglas C-119 transport.

The propeller allows its efficiency in the different high speed flight ranges through the use of different blade designs. Principal features of the new propeller in the method of mounting. All advantages include:

- Bellows engine of all propeller reduced bending moments. The engine shaft harness torque, oak, does not support the propeller.
- Blade subsonic efficiency in over all engine-propeller weight.
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Two significant concepts emerged from the recent Sixth Congress of the International Astronautical Federation in Copenhagen. One—the proposal for a new vehicle known as a “hotlined”-streamlined lean aerodynamic design. The other—the feasibility of the Russian delegates and their interest in a cooperative satellite project—was mostly by design.

In the following, include four American delegates to the Congress—Frederick L. Olverius III, Raymond E. Conner, Jr., and Norman V. Peterson—because the Congress is both an technical and a promotional agency. Mr. Olverius, with the Guided Missile Division of Republics Aviation Corp., is a director of the American Astronautical Society and editor of the *Journal of Astronautics*. Mr. Conner, a member of the Engineering Division of Bell Aircraft Corp., is also a director of the AAS and associate editor of the *Journal of Astronautics*. Mr. Peterson, with Sperry Gyroscope Co., is president of the AAS and a member of the editorial board.

Delegates from 20 nations, including Soviet Russia, gathered in Copenhagen for the Sixth International Astronomical Congress almost immediately after President Eisenhower's announcement of U. S. plans to place small, unmanned satellites in orbit during the coming International Geophysical Year (Jan. 1957-December 1958).

The announcement helped set the tone of the meetings, which produced two new-and-improvised-concepts. A new vehicle called a "sateloid" and called Krasov pictures of lively interest in the novel sateloid, explained on

The affidavit, prepared by Mr. Kraft

A recent paper seeks as to whether the Hirschman–Ishikowitz was a cause or a result.

Officially, it was somewhat routine in connection with preparations for the International Geophysical Year.

Coverdale, the United States, wished to "start the search" on Russia, believed to have been prepared to make a similar announcement of her own.

Conversely, it is possible that the long-atomically-ended Rarans oppositely grouped the octonians as a means of indicating potential mixtures while Big Four talks, now in progress in Geneva.

Some reports at the Congress speculated on the possibility that some

ments" may be Russian satellite vehicles. Although this is highly unlikely, it is certain that the Soviet Union is currently working on the satellite vehicle program. The first official post war Soviet operations entered in space flight was the Astronautics Section of the Children's Zoo Club.

Meetings were held each last year to discuss the concept to assist it in achieving its objectives and to form five technical committees. The fields of responsibility were Astronautical and physical aspects, rocket technology, environmental engineering, human biology, and automatic and remote control of an extraterrestrial flight.

A symposium on the ethical habits, was scheduled for the fall of 1954, but it is not known whether it took place. Late last year the Soviet Academy of Sciences (which directs all scientific research in the USSR) took over and headed a "Permanent Interdepartmental Commission on Interdisciplinary Researches in Ethics."

Head of the Commission was Prof Peter I. Kuznetsov, atomic scientist and radiation expert. Other key men included V. A. Anisimov, senior adviser and chairman of the Armenian Academy of Sciences; P. P. Pirogov, astronomer; and B. V. Kabanov, astro-physicist. Announcement of the commission's existence was made last August.

Russian satellite vehicle plans appear more ambitious than those announced so far in the United States. They have been described as automotive crash laboratories. There have even been police faced measurements by response. The Russian spacecraft hitting at an estimated 300 to 400 mph.

Three Soviet observers showed up at the Copenhagen Congress. Leonid Ivanovich Seduk, member of the Moscow Academy of Sciences and president of the Permanent Interdepartmental Commission on Interplanetary Communications; Kirill Vladimirovich Ogibaidinov, professor of physics and astronomy at the University of Leningrad, and Nikita Nikolovich Zubov.

Sedov thought the International Astronautical Federation (IAF) was a fine medium for international cooperation but said the final decision as to Russian participation would be up to Moscow. He seemed to feel, however, that Russia would cooperate with the American satellite programs. Sedov's thoughts were echoed elsewhere by Communist party chief Nikita Khrushchev, suggesting that the "Great spurt" had entered into the realm of reminiscence with a flourish.

After the administrative matters of the Congress had been sorted out, scientific sessions began with My Thakker's highly technical paper on the unfulfilled Curies' dream of the chemical synthesis of actinium.

*Paul Alessandro Bani (left) spoke on 'Auroral Satellite Cyclic Synchronization System': a technique for synchronizing a satellite in a circular orbit around the earth. This involves a pattern of sequential synchronizing forces whose direction is perpendicular to the line joining the earth's centre of gravity to that of the satellite. The magnitude of the force is proportional to the difference between the actual value of the signals velocity of the satellite and that of the orbit.

• **Methods** of determining the apparent mass (pictures of simple satellite configurations as influenced by the gravitational field) and varied atmosphere of the earth were discussed by Norman Peterson (USA). In his paper, he estimated lifetimes of satellites from zero

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curvature, anisotropic splines and causal body shapes. Patterns give a comprehensive solution of the differential equations for the spatial rise of diffuse reflections at face molecular flow. Issues in examination of several non-orientations be demonstrated that likewise among various models with absolute and

at 2000 m (USA) represented the natural pattern of grouped observations of artificial satellites. A white, 21 inch spherical look-seeing robot accompanied known values of the brightness, solar illumination and the visual threshold of the eye-captain optimum visibility at a zenith angle of 70 degrees as an example against the sun. Twenty-two if not known exactly when to look, the satellite, when north directed overhead at 200 miles altitude, will first be visible to 7-10 hertzian when the sun is 2.3 degrees below the horizon. For solar depression angles greater than 9 degrees, mixed eye visibility will obtain as long as the sun is 1.5 degrees below the horizon, but should be 5 or more degrees below the horizon.

• **Capit. Classe Fondi (Italy)**, discussing problems of market and scientific development, considered some optimism lowering stem-on equivalent, highest trade grossed areas well-served by rail roads. Advantages would be less air pollution in thinner atmosphere and numerous earth-sun effect like also thought a possible that the satellite could be substituted by launching a V-2-type missile from a Russian delta launchers or at altitudes up to 60,000 feet.

[illegible]

Space Biology and Physics

As might be expected, the papers in this field resolved many or less argued the biological effects of cosmic radiation. Switzerland's Paul J. Engelke reported on the present status of such research. He claimed that cosmic rays have produced definite effects on microbial bacteria, plant seeds, and eggs of invertebrates. Definite genetic effects were noted in all but the case where only skin burns were observed. Three plants of human skin exhibited genetic (which later changed to) mutations.

months—often about six months.

Prof. J. J. Singer (USA²) is a true advocate of causative effects on matter at high altitude: "I think that the physical effects on both man-made and biological matter can be separated into atomic and nuclear effects. While the biology of effects has been the subject of intensive study (except in the case of latent processes), this was the first monograph of nuclear effects. Singer showed that while they are small, they are cumulative. He gave numerical values and described a method in which he found effects could be summed."

He speculated whether cosmic ray bombardment would cause the planet's unprotected surface (no atmosphere) to become radioactive making surface exploration dangerous to human beings (he does not think so). He discussed the absolute prohibition against human

propanol and used that hydrogenation protocol as the most efficient on a weight basis, especially as a fragmentation shield.

Dr T A Heathcock (USA) explored the physiology of space flight. He showed that physiological and pathological effects at 61,000 feet are equivalent to those encountered in a complete vacuum. From there on up scaled environments would be necessary.

Advanced Flight

He reported that people at Ohio State University were studying the problem. While simple air-conditioning systems for stored cabs have always been recognized, Mr. Hattwood felt that biological methods (such as using bulk plants) needed more study. He deemed this made no sense at very warm conditions.

At about 30 min of ischemia, two body swelling effects occur. The first is due to isotope expansion of interstitial gases. The second is apparently due to the heaving of blood and other body fluids. An exposure of two minutes or more is almost certainly lethal.

Hitchcock noted the dual problems of manned flight into space as acceleration, zero gravity, aerodynamic heating, noise and vibration, disorientation and visibility. There are answers but they can be solved.

Two other papers on this general subject were presented. One by Saito and Steinacker (USA) on the effects of primary particles on balloon house spiders, the other on corpuscular rays from the Sun by Mr C. F. Anderson (Denmark).

Three papers by Italian delegates, Prof. Antonio Culo, Renato Fumagalli

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¹⁰ "The Challenge is Urgent," *Newsweek*, 25 Jan. 1994.

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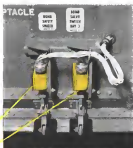
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Civil Charter Parts To be Studied by CAB

Washington—The Civil Aeronautics Board this week is scheduled to begin hearings that could help America's air charter operators better their lot as worldwide recognition of first, commercial carriers of passengers groups and cargo.

The latter of the charter business in the United States is directly tied to the first hearings on requests for civil charter exchange in the ambitious American Transport Association and the Independent Military Air Transport Association. ACTA and IMATA already operate exchange for military charter.

In the 13-month period ending Sept. 12, 1974, the 11 member firms of ACTA and IMATA flew some 115.8 million ton-miles in military and civilian passenger flights and 57.6 million ton-miles of cargo. Military charters were arranged through the "voluntary" exchange. Civilian flights for use booked through the facilities of the scheduled airlines.

Another charter service negotiated through the ACTA exchange has increased from a 1974 dollar volume of \$17,307,800 to \$40 million this far in 1975.

ACTA's long-term charter exchange could be one of a "multiple charter basis" in several groups of passengers or cargo companies contributing one plane. IMATA, however, intends to use only single charter for each of passengers or cargo companies at a time to the scheduled airlines of the scheduled airlines.

Both exchanges would serve only bona fide organizations requesting transportation. Charter clearing houses would be prohibited from dealing with individual agents, although this could cause constraints from freight forwarders.

Officials of both organizations are optimistic concerning the approach, being their hopes in their last factors:

- Board's favorable preliminary decision. President Paul Fierler lauded the exchange for a "diverse and broad" (AW July 8, p. 79).
- Increased use in Defense Department only. Consolidation of civil and military charter traffic would eliminate waste, streamlined system, increasing the pool for each customer.
- More economical second industry. A uniform charter system would give the airlines a more consistent foundation.
- Revival of two exchanges would further boost charter.
- Severe Recommendations. In 1973,

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The Narco DME gives this information on two scales—0 to 20 miles for close approach work and 0 to 200 miles for en route navigation.

Use of DME by Mohawk is expected to effect considerable economies by pilot steering expedient DME approaches.

Executive Pilot Praises DME



E. E. Moore, Executive Pilot for G. T. Dew (Dew), Board Chairman for Aero Design and Engineering Co., manufacturer of the Narco DME, has flown 700 hours with Narco DME during the past year and a quarter.

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"Expedient approaches on instrument air traffic by advantage of DME. Because we can get the answer exactly where we are, we can give our passengers a more pleasant ride."

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a Senate Small Business Committee approved a similar charter exchange.

A recent nationwide survey of charter users by IMATA reported that establishment of a charter air exchange would increase traffic 100% and provide an opportunity for exploiting the potential charter market (AW Feb 7, p. 54).

The market is made up of three principal groups:

• **Convention travelers.** Organizational delegates would rather charter "one town of a place" for 10 to 15 members than to buy individual airline tickets.

• **Exhibition and trade shows.** Transportation of a company's machinery is often postponed until the last minute when such a chartered plane can get it to its destination on time.

• **Production managers.** Emergency flights are often necessary to carry replacement parts for vital production machinery in order to avoid plant shut-downs.

• **Travel agencies.** Availability of fast transportation on short notice determines profit and loss for such groups.

• **College and professional athletic teams.** Theoretically groups and officials or spectators from occasionally acquire flights on short notice.

The large charter market has accordingly expanded a charter exchange for the last eight years. London's British Air Exchange handles the great majority of international airline charter flights. There also are trade associations in France and Germany with interests similar to the Beltra.

Since 50 percent United Kingdom and Europe operations are represented on the Exchange, which is worldwide in its scope. Foreign charters are handled primarily by carriers in the category equivalent to our certified airlines: British Overseas Airways Corp. (BOAC), Transports Aeriens Belges (TAB), KLM Royal Dutch Airlines, Air France and Air India carry much of the charter traffic.

Rapid success of the exchange was based early on the shortage of suitable long-distance, high-capacity, long-range aircraft—such as the Boeing 707, Douglas DC-8, and Lockheed L-1011. With the increased availability of these aircraft, charter flights have dropped appreciably.

Lower cost, however, is not one of the advantages afforded shippers and organizers of passenger parties. Speed of operation, global service and new routes also have attracted business to the exchange.

Recent exchange limitations have reduced that passenger flights constitute a greater percentage of longer charter traffic than ever before. During a recent week, it rose higher than 50% of the total charter service on the exchange.



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Cutlass Joins Fleet



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SEVEN YEARS after the production of its prototype, the Chance Vought Cutlass actually joined the Navy as an operational boat. Spectrum VF 124, equipped with 14 F7U's, boarded the carrier USS Hornet (above) and left for extended duty in the Far East. The F7U's were slow in reaching the fleet because of delays in engine development.



These weather items prepared in consultation with the United States Weather Bureau

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Care should be taken in approaching a ridge and the wind, because in a low-powered plane the downdraft may make it impossible to maintain enough altitude to clear the top. Also, when taking off on a runway towards a hill, be prepared for a decreased rate of climb if the wind is coming over the hill.

When flying in the vicinity of mountain tops, the possibility of altimeter error is important. Two primary factors can cause altimeters to indicate higher altitudes than actual. Low-level pressure caused by disturbed flow on the lee side and extremely cold temperatures. Combined, they can produce errors in excess of 1000 feet.



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OPERATIONAL FLIGHT TRAINER for the McDonnell F2H-2 fighter. Student's cockpit is at left, instructor's station at right.



Navy's Special Devices Center; Better Training, Less Expense

By Henry Lefler

SAINT PAUL, E. L., N. Y.—The Special Devices Center of the Office of Naval Research here is one of the Navy's key weapons in the struggle to cope with the increasing complexity of modern aircraft.

The attack goes on along many fronts but for the most part SDC's approach is to develop training equipment to permit pilots and crews to learn a great part of their jobs on the ground without being up expensive aircraft, and without being hampered by learning factors such as weather. Special Devices Center is also responsible for the provision and control of logistic and material support for training equipment.

The center's projects include operational flight trainers (Air Force calls them flight simulators), procedure trainers, tactical trainers and simulated ground stations. It has worked out simplified cockpit instrument presentations. SDC psychologists are delving into human engineering aspects of flight, crew training and maintenance. SDC engineers have developed various types of hypoxia equipment.

Special Devices Center is under the office of Naval Research. Its more than 600 personnel under Capt. C. H. S. Mayhew, are mainly civilians. The civilian complement includes about 45 from Navy Air Arm Participation Group and Air Force liaison officer SDC is the designated agency for appropriate Air Force research, characterizing the need for a specific Navy organization of this type. One recent development for Army is the Nike simulator which permits the operational training

of Nike batteries without use of actual missiles or target aircraft.

The Air Force representative action has proposed projects to develop duplication of work in flight Air Development Center and Special Devices Center.

The Research and Development Department, one of the five major groupings at SDC (the others are Training Requirements and Field Operations and Administration and Services), is under the command of the center's technical director, Capt. Edward W. Hilder.

It is composed of three divisions capturing development between equipment and equipment research (as is indicated in the figure). The various

divisions are made up of a number of branches.

Of special aviation significance are most of the projects of Engineering Development's Aviation division, to which the remainder of this article is devoted.

The Aviation division covers all

- Operational flight trainers
- Aviation trainers
- Air applications
- Cockpits

In charge of these four branches is John Hilder, reporting to Capt. Hilder.

Operational Flight Trainers

This branch produces OTTs and procedure trainers.

Operational flight trainers are designed to reproduce all flight problems from takeoff to landing, including simulated malfunctions and other difficulties. Some are simulators of the



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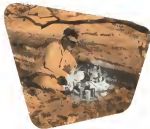
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actual aircraft we also depicted. About the only feature of being that is missing is the effect of G, which has proven difficult to duplicate.

Ground-based trainers are used to give novices an orientation, tactics and instrument procedures but do not simulate loading or blast conditions.

There are about 10 GFTs in the field, with another 25 or 30 in the works.

One of an GFT's views anywhere from a simulator for a fighter like the McDonnell F-101 to a seat for Martin's subsonic jetcopter, the F5M, with stations for the main crew of six. The F5M trainer consists of two trainers, one containing the flight seat later and the other the tactics simulator, to provide training in the plane's subsonic warfare arena.

SDC designs all of its GFTs in 81 weeks, 40-45 weeks, making for very transportation team cost to cost as situations are shifted. The trainers are equipped with cargo loads so fast they can be slung aboard aircraft carriers if the Navy decides to make such a move. This would permit carrier crews to maintain flight proficiency against the risk of rapid obsolescence. "Trainer trust" would also make it harder to install or remove the simulators in a carrier without from one type aircraft to another.

The trainers are self-contained, except for the power supply. A typical trainer includes capacity for 10 tons of air conditioning, for comfort of personnel and to keep equipment temperatures within variable operating limits.

Development of an operational flight trainer is no easy matter. A typical flight simulator may require 50,000 engineering man-hours and perhaps 40,000 production man-hours. A. A. Heston, the GFT branch head, says that the F5M required between 150,000 and 175,000 engineering man-hours, with an additional 75,000 man-hours for its associated tactics trainer.

As with all other projects, the center either builds the first prototype or lets out the requirements, then lets build from primary contractors for building production units.

An GFT is designed for a specific type of plane (F5M for subsonic) and generally for a specific model (F5M-2) because of the complexity and high cost of a typical trainer (51 million). SDC has embarked on a number of programs. For example, new GFTs are being built so the cockpit can be removed and hooked up to a tactical trainer. In this way, a single tactical trainer can be used in conjunction with a number of different types of operational flight trainers.

The GFT branch is also pushing a



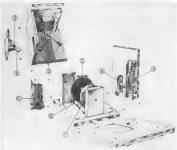
FIG-4 JUMP TRAINING was converted from a tank trainer. Like other trainers and simulators developed by Special Devices Center, it is first of its kind.

program to standardize components and designs used in the latest one-trainer building simulators, to simplify maintenance, reduce the number of spare requests, and cut weight and cost. SDC is offering trainers and equipment suppliers in the approach.

A typical electronic unit had its weight cut to 15 or less 51 as when trainers were used in place of tubes.

In volume cut out to 11 or to from 100 to 10. An associated part which was redesigned for magnetic amplifier weighed 100 or below and 51 or after. Size was cut from 216 to 50 or so. Power requirements were reduced from 10 watts to 1 watt.

Another problem the GFT branch is studying involves simulating instrument attraction. Contractors' experts are now free to design their own circuits.



GAMMA-DIRECTIONAL ACCELEROMETER developed by Special Devices Center is used in aircraft safety research. It is required by a 100 shock and 1000 g's. The parts are (a) trigger assembly, (b) shock pads (c) drive assembly, (d) test elements (e) support, (f) main spring and (g) barrel component.

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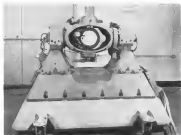
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THREE-DIMENSIONAL FLIGHT TABLE developed by SDC's Computer Branch is used to test behavior of aircraft control systems. It will take a 50 lb. order sheet.



LARGE ANALOG COMPUTER feeds variables into three-dimensional flight table.

and techniques for selecting instruments as long as the final results meet SDC requirements. In developing standardized techniques, G-E personnel hope to reduce maintenance and repair requirements. The G-E has converted a number of simulators for obstacle planes to newer strip-chart recorder building a new simulator but still as expensive job, involving a redesign of computer circuitry. A typical conversion may take from 14 to 18 months.

Ground-based simulators are also converted to new means to an equivalent manner. Revised units include trainers for the ZXC-2 simulator and for helicopters.

These are basically lead trainers, with cockpit changed to represent new functions and controls "dressed down" to the proper grade.

The Aviation Branch branch is responsible generally for all training

devices which do not come under the G-E's branch. Many flight simulators procedure trainers and associated power training aids.

• **Procedure trainers** are, comparatively inexpensive devices designed for specific procedures, such as cockpit familiarization, navigation, low, emergency, etc. Although the cockpit is an exact replica of a specific plane, as it is in the typical flight trainers many of the instruments are dummies. Only those involved in the actual procedure to be taught are operative.

A recent trainer, the T-312 helicopter control flight simulator developed for SDC by Bell Aircraft Corp. (AW Aug 29, p. 9) is expected to give the equivalent of full hours of primary flight instruction. It will be installed at the Navy Flight School, Pensacola, Fla.

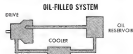
The student sits in the T-312 cockpit



DOUGLAS AND SKYHAWK USE LIGHTWEIGHT GENERAL ELECTRIC CONSTANT SPEED DRIVE

How G-E constant speed drive's unique design improves Bantam A-bomber performance

The unique ball piston design of the General Electric 9 KVA hydraulic constant speed drive improves the performance of the Douglas A-1H Skyhawk by providing a more reliable drive of reduced weight and size. The simplicity and symmetry of the five moving parts also permit the drive to run "full of oil" in a completely oil-filled system.



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- POSITIVE LUBRICATION** all moving parts operate in oil bath

VERSATILE 9 KVA DRIVE almost infinite of starting speed on A-1H Skyhawk

The General Electric hydraulic constant speed drive is currently being built in 9 and 16 KVA rates. Drives can be built up to 60 KVA covering a wide range of speeds and many design variations.

FOR SPECIFIC INFORMATION on how a G-E constant speed drive can be designed to suit your particular application, contact your General Electric Apparatus Sales Office. For further technical information on these G-E drives, write for literature GEA 5879 and G-E 2480. Address request to: General Electric Co., Section 223-3, Schenectady 5, N. Y.

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In 1945, G-E jet engines powered America's first jet aircraft, the B-24. Today, more G-E jet power Air Force planes than all other jet engines combined. The sleek Boeing B-47 bomber uses six G-E J47's. In addition, J47's power the nation's jet fighter machinery, the North American Aviation F-86 Sabre Jet.

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World War II "Liberator" had gun turrets powered with G-E amplitron drives, directed and fired manually. Today, newest TAC bomber B-44 has G-E fire control system which is radar directed by remote control.

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First American helicopter engine built by G.E. had 2150 hp. Today, smaller, more efficient gas turbines power helos, power-to-weight ratio for helicopter and other aircraft applications.

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G.E. supervised new development of V-2 rocket, shown above in first launching from U.S. aircraft carrier. Today, advanced G-E design rockets like the RV-A-18 provide new drive on large solid propellant rocket motors for use on guided missiles.

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pit, which is a replica of the Bell HTL retractor mechanism, while a perspective image of the terrain is projected on a hemispherical screen below him. Behind the image from two projectors a horizon line showing air and horizon conditions and a basic terrain map—showing an intense point source of light and colored terrain characteristics—are blended to produce a realistic composite image for the trainee.

Peek-off potentiometers mounted on the standard HTL controls provide basic inputs to a special-purpose, all-trading computer which solves the dynamic equations of motion in real time and sends output commands to six servo drives associated with the projector and the terrain instruments, vibration drives and scene generator in the cockpit.

The projector light and transparency are suspended together by a global system for pitch, roll and yaw of the whole projector, insulating for the pilot the actual appearance of the horizon and horizon in his views various control in the T-71C trainer.

While the T-71C can prove useful in training cockpit pilots, a primary reason for its development was to test the control achieved through use of transparencies and the point source of light.

Work is under way on a similar trainer for fixed-wing aircraft. Another approach to the problem of helicopter flight simulation is being studied by SDC's Air Applications branch. Have a constant model of the terrain is built and viewed by a pilot vision camera connected through appropriate computer to the terrain cockpit. An enlarged TV image of the terrain is projected on a hemispherical surface in front of the cockpit. As the pilot "flies" the projection is varied so the image he sees corresponds to the real thing.

Special Devices Center is also working on helicopter ground simulator trainers for the Fairchild H-21 and Sikorski H-19 for Army.

A recently completed project is the procedure trainer built by Canadair Corp. for the Grumman F-111F Tiger Navy fighter.

When first revealed by Aviation Week (Mar. 28, p. 15), the unit was known as the F-111F procedure trainer but the designation of the plane has since been changed. A later development is the award of a contract to Link Aviation for a Tiger operational flight trainer.

H. R. Fleiss, project engineer on the Tiger procedure trainer, sees the cooperation of Grumman and the instrument manufacturers during design and construction of the unit, helped

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The first Civil Aeronautics Administration certification for commercial use of a U.S. designed and built turboprop propeller has been awarded to Model C16345 of the Curtiss-Wright Turboelectric series.

The C16345 and other Turboelectric models are already in quantity production for some of the nation's most advanced military aircraft types—both operational and experimental. The new CAA certification now makes available to commercial airlines the high standard of performance and the light demonstrated efficiency of Turboelectric.

Propellers provide the most efficient means of converting gas turbine power into useful thrust. Curtiss-Wright Turboelectric—with one-piece casted hollow steel or solid steel blades—features full synchronization plus synchro-basing... full feathering, by either manual or automatic means... full reversing... single-lever power control.

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Loop development time to a minimum. Flare sets a typical procedure, however, and only \$50,000, compared to approximately 25 times that figure for a simulator.

It is hoped eventually to supply squadrons with procedure trainers well ahead of the delivery of new model aircraft and considerably before the long-lead-time OFTs become available.

• **Activated panels.** or Naval air mobile trainers as SDC calls them, take the place of customer or actual training system, and are designed to be stored processed in the operation of various systems.

The NAME panels, powered by SDC, consist of large lighted reading screens of various plastic systems. Some screen ones use colored lights to indicate line or sequence of operations when a system is activated. The panels fold up into standard portable carry cases, so they can be transported from base to base and set up quickly, in a test of accuracy.

The unit was in compliance with the aircraft Airline Bureau, who worked on the RTV Super Configuration set, was a section 14 presentation, including two of the flight control systems, one electrical (one a.c., one d.c.), flap control, fuel, fuel injection, oil, deceler, heating and ventilation, and presentation.

One RTV set is going to Federal Naval Air Station, another to USAF at Hickam AFB, Hawaii.

Among the contractors building NAME's for Special Devices Center are Technical Training Aids, Ltd., based Aircraft Service, Inc. and Grand Central Aircraft Technical Training Aids, which, delivered to Navy, the first plastic lighted simulator trainer.

These were for the Douglas B-1 (DC-6) and are now in service with Military Air Transport Service in California, Florida and Massachusetts. Another TTA mounted panel set—for the C-130—was described in Aviation Week Nov. 16, 1975, p. 85.

Air Applications

The Air Applications branch has developed procedures, all of Navy's aerial training devices. Personnel of this branch have been working on simplified instrument displays for some years now. As long ago as 1949, Major James H. Anderson, USAF, SDC had worked out a pictorial cockpit display, similar to the one installed last year on the F4U-6 (AW Jan. 28, 1954 p. 69). Then the F4U-6 display was the only one carried through to completion. Its lower half shows a ground landscape and heading indicator which rotates as the airplane shifts turns. The remainder

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the past has been their computer's slowness. Whereas analog computers have been able to show us instantaneous pictures of conditions, personalizing them as in "real time" problems, digital computers must perform a stop-step waiting process, so their output lags the input in an appreciable time. (Unless, the customer "buys" which was used in use of the radio-TV set needs to involve trends during the last Presidential election, is a digital unit).

However, in recent releases, the Computer branch's new digital computer will be instantaneous for all practical purposes. Programming an airplane's characteristics is much simpler in a digital than in analog computer.

William Zuretti, of the Computer branch believes that 1970's the pre-digital computer, production of new GFTs could be considerably speeded. At present, a computer for a particular aircraft must be built until the plane has flown and its characteristics learned. Log between delivery of the aircraft and the first GFT usually runs well over a year.

With the new unit, analog comparison could be built on a computer base and kept on the shelf until needed. After the new machine this programming work for the computer can be done in a few months. The same computer design could be used for many different planes and variants with only the programming and cockpit installation changed in the latest simulation.

Also, a particular GFT could be changed from one type of aircraft to another in a matter of hours instead of the months now required. This feature together with the practice of designing flight simulators in the cockpit installation is such valuable, could greatly increase GFT flexibility.

A three-dimensional flight table developed by the Computer branch is being used to test modern missile weapons systems and other components. Bendix has been operating the unit for about a year at Detroit for Boeing. Another unit is being built for USAF to be installed at Hillhouse, AF.

At present the table's use is limited to problems where solution around the area is less than a single turn. However, with installation of slip rings, the table will permit unlimited rotation.

The flight table is designed to be used in conjunction with a large computer, such as the Tipler or C-10, allowing complete missile equations.

The new weapon circuit is mounted in a special holder on the table and directed, unidirectional, conditions are programmed into the computer. These are then fed to the table and behavior of the rocket circuit studied. The table will accommodate diameters up to

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 Norwich New York

AIRCRAFT IGNITION AND ELECTRONIC EQUIPMENT

50 lb. in weight and 5 in. in diameter. Performance parameters designed into the table, for example, are unimpaired overall performance, according to Jack R. Bonetti, project engineer. Vehicle capabilities are 100-160 radius/second, with 10 lb. load, 100, 15 rad/sec, unloaded pitch 12 rad/sec, unloaded. Articulation capabilities are 100, 200 and 300 rad/sec, with representative load and 100 rad/sec, unloaded, pitch, 100 rad/sec, unloaded. Dynamic response is 100 to 125 cycles/second, to 100, 51 cps, in pitch. 51 cps. Postload accuracy is within 0.2 degrees.

PRODUCTION BRIEFING

► **Black Manufacturing Co.**, 1450 Bellevue Ave., Detroit 7, Mich., announced the expansion of their West Coast facilities through their exclusive West Coast representative, Milton A. Menor and Associates. The new building construction, 7,000 sq. ft. of floor space will provide facilities for sales staff, order department, warehouse and tool room. New address will be 1257 Arbor Vitae, Inglewood, Calif.

► **International Cooking Institute** announced the completion of a Sales and Nutrient Survey by the certified public accounting firm of Seck and Dumas. The survey shows that average 1954 sales for the companies reporting amounted to \$997,975, 1955 volume is expected to reach \$125,000,000. Copies of the completed sales and profit reports are available from the International Cooking Institute, 27 E. Monroe St., Chicago. It is cost of \$10 per copy.

► **The Bill Jack Scientific Instrument Co.**, Solana Beach, Calif., has created a research and development laboratory at an initial cost of \$100,000. New direction of research will be Dr. Charles C. McIlwain's aided by Dr. John B. Brumate.

► **Long Beach, W. Va. silicone plant** of Lucite Ac Products Co. a division of Union Carbide and Carbon Corp., is scheduled to start production this fall. Several buildings have already been completed and about 100 people will be employed by the end of 1955.

► **Hered Products, Inc.**, has installed a new production line to produce aluminum locomotive sheets up to four feet wide. To accommodate the fast-growing production schedule, Hered's house plant in Oakland, Calif., moved into additional floor space giving a total of 100,000 sq. ft. A new branch plant is also being installed in Beltsville, Md.



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Tacan Makes Public Bow, Passes Test

By Philip J. Klass

Nether, N. J.—The first public display of Tacan by Avionics Telephone & Telegraph Co., whose Federal Telecommunications Laboratory developed the controversial navigation and communication use of the advantage which generated the military to develop the system.

Using an H-67 DC 1 over known Indiana whose bearing and distance to the Nether Tacan ground station was precalculated to permit speed checks, the military force set approved to be accurate to within one degree in bearing and within 0.2 mile of distance to 50 miles from the Nether station. The private firm set performed nearly as accurate.

So far as the pilot is concerned, the operation of Tacan and its cockpit presentation of bearing distance information might have been coming from a VOR DME except that Tacan's bearing indication was calculated by means which corresponded to the plane's VOR needle to pump several degrees.

Similarities and Differences

The latter DME Tacan controversy has tended to obscure the many basic similarities between Tacan and present civil VOR DME. There are differences, however—differences which H-67 shows are Tacan's advantages and possible potential. These include:

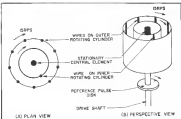
- **Clear-channel DME**, in which individual channels are provided which, by frequency separation between stations in place of the present frequency assignments required by civil DME, to provide individual channels. The Tacan clear-channel makes wavelength available for additional functions such as bearing, instrument landing, data link and, possibly at some future date, voice communication to (or from) civil stations.
- **UHF-band (1,000 mc)** operation of both bearing and distance functions makes Tacan's emergency bearing can be much less affected by noise and interference over the antenna than a VOR, which operates in the low-frequency VHF band (112-118 mc). For the same reason, Tacan can use a much smaller ground station antenna, an important consideration for Navy shipboard and various USAF mobile installations.

• **Combined "course" and "fix" bearing** indicating system provided in Tacan enables it to provide greater accuracy than VOR.

Civil and Tacan DMEs operate on



TACAN, the present VOR DME, provides pilot with bearing and distance to ground station.



GROUND ANTENNA, consists of outer DME element and two rotating cylinders which produce

for same basic principle as airborne set transmits an interrogation pulse which is received by the ground station circuiting it to transmit back a pulsed reply.

The airborne equipment receives the tone returned between the interrogator and reply. The interval is proportional to the airplane's distance from the station.

Both types of DME transmit pairs of pulses for interrogation and reply to



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REPUBLIC'S F-84 "THUNDER TWINS"—TWO MORE VITAL MILITARY AIRCRAFT WITH MAJOR COMPONENTS by TEMCO

These TWINS complement each other ideally. Thunderflash, the photo reconnaissance twin in the foreground, locates the target. Thunderstreak, the A-bomb carrying fighter-bomber, smashes same. Designated RF-84F and F-84F, these combat twins are two of the Air Force's most versatile planes. In addition to their regular missions, the Thunderflash has a special assignment. It has been equipped to be carried kangaroo fashion in the belly of a B-36 and launched or retrieved in the air. Thus, fighter speed over the target is coupled with bomber range—a formidable combination. Repeat large production schedules smooth on these planes by subcontracting several assemblies, including vital fuselage sections of both, to TEMCO. Work on these vital planes is reinforcing TEMCO's well established reputation for producing a quality product, on schedule, at one of the lowest costs in the industry.



Thunderstreak and Thunderflash inner fuselage sections scoring completion on TEMCO assembly lines.



ENGINEERS — If you are interested in a position with a growing weapon systems organization, write full particulars to E. J. Hooten, Jr., Engineering Personnel, TEMCO Aircraft Corporation, P. O. Box 41791, Dallas 2, Texas.



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Beamed beam shows how airplane passed between storm cells, its its flight path.



Measures and miles are used when a pilot is able to find a smooth path through turbulent areas.



ARW-10 antenna mounted in nose of airplane scans the forward area, enabling the pilot to evaluate storm conditions far ahead.



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More and more leading air lines are equipping their ships with RCA's new weather-mapping radar. Their choice has been based upon exhaustive comparisons.

RCA's AVQ-10 is the first airborne radar to use C-Band (3.6 cm) transmission, the wave length most suitable for "looking into" storms, yet having the least amount of scope clutter. It presents the pilot with an easily-interpreted display of storm conditions around him. In addition, it gives the pilot valuable ground-mapping information.

In terms of time saving and increased passenger comfort, the RCA AVQ-10 weather radar is more and more becoming a "must" among air lines. With it, pilots can "see" into storm areas many miles ahead and pick non-turbulent paths between them, often making long and costly detours unnecessary.

RCA is proud that these distinguished air lines have chosen the AVQ-10 to save time and increase passenger comfort. Every effort will be made to meet additional commitments occasioned by the great and growing demand for this equipment. To assure early installation, other air line and private operators are invited to write immediately for further particulars on the RCA AVQ-10. Overseas customers should get in touch with the RCA International Division, 50 Rockefeller Plaza, New York City, or any RCA International Distributor.

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These environment-proof precision switches are solving many existing aircraft design problems

• MICRO SWITCH not only offers the most complete line of precise, dependable switches for aircraft applications, but gives a wide choice of environmentally sealed and nonconductive proof switches.

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Shown on this page are just a few of the precision switches developed by MICRO SWITCH engineering to meet specific aircraft design requirements. Whatever your switch need, it will pay you to consult with MICRO SWITCH engineering. For our division the name "MICRO SWITCH, Evansville, Illinois" has been recognized as the stamp of precision switch quality.

These are 28 MICRO SWITCH branches in eleven cities where MICRO SWITCH Engineering Service is at your call.

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MICRO SWITCH

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at 15 revolutions per second, causing the control pattern to rotate at the same speed. Its effect on an aircraft's Tacon receiver is a 15 cps (unilateral) modulation of the signal strength of DME pulses received from the control station. Maximum signal strength will be received when the peak of the modulated pattern, rotating in space, is parallel to the aircraft.

If the center element is caused to emit a signal pulse code at the instant the modulated peak, sweeps past North, then the time interval between the reference code and the instant of maximum received signal will vary according to the airplane's "course" bearing to the Tacon ground station. Swept an other way, a comparison of the detected phase of the 15 cps modulation appearing on the DME pulses relative to that of the North reference code establishes the appropriate aircraft bearing to the station. (See sketch, p. 61.) The North reference code consists of a group of 12 pulse pairs, each pair equal 30 microseconds apart.

When VOR provides a 15 cps modulation of the continuous carrier, the Tacon "course" bearing gives a 15 cps modulation of a group of DMF pulses. If there is a sufficient

Co-Channel Spacing

Little confusion was created by the VOR, two Tacon stations can be operated at the same frequency within line-of-sight distance of one another without interference, according to an ICAO spokesman. Flight was conducted with both the North and Atlantic City Tacon ground stations operating at the same frequency, indicating that the Atlantic receiver station, tuned to the closest ground station until the signal strength of the other became stronger. However, in practice Tacon stations operating at the same frequency will be located 100 miles apart where feasible.

number of DME pulses being emitted, the use of a peak riding detector at the Tacon receiver enables it to reject the 15 cps modulation envelope in other words as if the station employed a continuous-wave transmission. Tacon's courtesy modulation purposely is kept down somewhere between 17% and 50% to be sure that the DME pulses are not modulated sufficiently to prevent their use for distance measurement. If, however, there are two aircraft in

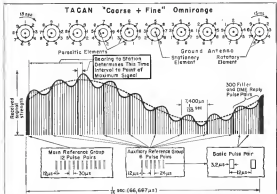
the area, DME reply pulses would be too infrequent to permit the Tacon receiver to extract a faithful reproduction of the 15 cps modulation. To take care of this situation, the Tacon ground station superimposes DME reply pulses with 30 cps, randomly spaced, so that a total of approximately 2,700 pulse pairs are transmitted over a second (plus an additional 900 pulse pairs, science and statistics require pulse pairs, to be described shortly).

(This "control rate code" tone of operation plus another important role in maintaining an essentially constant load on the ground station power supply to prevent fluctuations which might introduce spurious signal level modulation or affect operating frequency.)

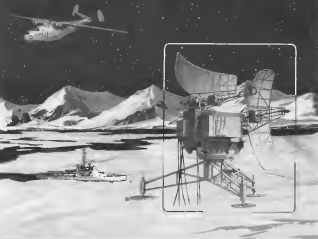
As more aircraft intercept the ground station and the DME range increase in number, the Tacon ground station automatically reduces the number of "30 cps" pulses.

Precision Omnitrange

Less than 400 feet bearing accuracy is required in the addition of a "fine" or "refined" station which is superimposed upon the "coarse" one already in service. This is done by adding another 15 cps carrier, 15 inches in diameter



PRECISION OMNIRANGE bearing accuracy results from addition of coarse and main reference elements which produce 15 cps mode being superimposed on the 15 cps "coarse" signal (shown dotted). Phase relationship shown is for an aircraft due left of the station.



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they directed SPAR with a few lines, checking it in one unit it was barely recognizable. But the moment they reorganized SPAR, it passed into operation as easily as though it were in Sunny Florida. No wonder the Navy has ordered two SPARs to accompany the next antarctic expedition. Easy to carry, easy to set up, easy to operate, SPAR can be trusted to bring 'em in safely and quickly under the worst conditions imaginable.

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TACAN ground station antenna atop Fish and Telecommunication Lab tower.

ice, containing nine parabolic (handed) antenna rods to the Tacon ground station antenna. The larger cylinder surrounds the rods with a single parabolic element, and both rotate at 15 cps.

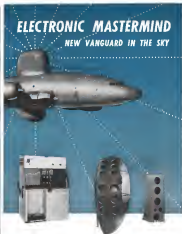
Each of the nine rods in the outer cylinder produces an additional dimension of the signal pattern rotated by the rotor DME element. This produces a synthesized waveform which is superimposed on the base coded pattern. (See sketch, p. 55) The overall result is to produce a 135 cps composite modulation (9 x 15) on the DME pulses rotated from the rotor element, in addition to the 15 cps modulation.

The phase of this 135 cps. envelope cannot be directly compared with the even (North) reference signal used in the "atomic" system because there are nine holes, at 45 degrees between successive reference signals which would give some possible points, 42 degrees apart, each



SHARPE antenna rods antenna in) reflect for Tacon, where VOR/DME requires use of both antennas.

AVIATION WEEK, September 26, 1955



THESE RADAR COMPONENTS fabricated by Lavelle help make advanced concepts in the use of electronics a working reality. Look-hood's and gun turret phones in each—a complete airborne radar search and control system for both offensive and defensive operations brought forth by the "magi-back" radar in the control tower telescope give altitudes of all aircraft within radar range.

Radar Reflection and Reflector Support for the plane's complex bright finding system were designed and produced by Lavelle in close cooperation with Philco Corporation. Like the intricate Radar Console housing, also made by Lavelle for Philco, they are typical of the precision components fabricated by Lavelle for leading electronics, jet engine, and aircraft manufacturers.

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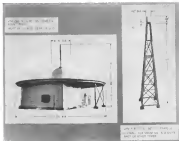
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with the same phase relationship

Resolving Ambiguity

To resolve this ambiguity, the central
DMK (display) transmits eight auxiliary
reference codes, coding one for every
40 degrees of antenna rotation (See
sketch, p. 63). The main reference
signal completes the cycle. Each aux-
iliary reference group consists of six
subgroups, spaced 24 (microseconds
apart).

This enables the Tacon receiver to
compare the phase of the 15 cps. modu-
lation relative to the main reference
signal to establish which 40 degree sec-
tor the waveform is in, then to compare
the phase of the 135 cps signal with
the second auxiliary reference signal to

resolve ambiguity bearing down to less
than one degree.

The antenna receiver has two rotary
phase shifters, one geared up to turn
at twice twice the rate of the other,
driving from a small servo motor. Dur-
ing the initial search mode, the slow
speed shifter scans the phase of the 15
cps signal, which controls the lighting
of going circuits, until the main
(North) reference pulse group occurs at
the instant of the pulse. When this
happens, the Tacon receiver goes
into its track mode. The servo motor
control of the servo motor to the output
of the auxiliary reference group channel
which operates to keep the 135 cps. pulse
centered around the auxiliary reference
pulse group. When the pulse is in cen-
ter, the antenna's status bearing is
proportional to the position of an out-
put shaft from the phase detector gear
train.

If the Tacon reference signal is
synchronous with the track mode,
the equipment will maintain an lock
bearing for three seconds. If the signal
does not return within this period, the
unit automatically returns to its search
mode.

Performance Details

The antenna beam interrogator
transmits on an one of 125 channels,
spaced 1 mc. apart, in the 1,625 to
1,750 mc. band. The ground trans-
mitter applies on one of 126 channels in
the bands of 962 to 1,024 and 1,154
to 1,215 mc.

For the first 63 channels, the an-
tenna transmits frequencies at a be-
quency which is 65 mc. higher than
the ground transmitter. For channels
64 to 126, the antenna transmitter be-



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895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

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*The only propeller turbine
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150 Hz, depending upon inductance value. Unit withstands temperature of -51C to 228C. Unit has wire leads specially designed for ground circuit use. Tested over 100,000 hours per motor. Price Co., Inc., 11425 Vanowen St., North Hollywood, Calif.

●Magneto pulse generator, Type MF 414-A, is rugged electronic oscillator can replace four vacuum tubes. Device is a line-type pulse whose repetition rate is equal to line frequency. Input voltage is 12.5 V. at 400 cps. Pulse rate time is 1 sec. with a pulse width of 40 at 50% amplitude. Unit weighs 14 on Bellkote E3 704 gives application data. Magneto Research Corp., 290-202 Center St., El Segundo, Calif.

●Speech act, Type 100-515, operates in Multichannel but has built-in control wiring action to eliminate drift and bounce. Contains two channels, 1.5 sec. inductance or 5 sec. response time. Can maintain up to 10,000 counts available and drop out can be selected to 0.1% of peak up voltage value. Also can be connected to model control with serial plug-in line or with data control, and is available in a variety of control arrangements from SPST to DDTT. Unit measures 14 in. dia x 12 in. H. H. Tech-Fab Corp., 87 Brent Ave., Livingston, N. J.

●Solderless connector for printed circuit boards called "Micro Pin Solder", into which leads, transistors, and other component leads can be connected without soldering. The solder's space as two leads component leads rapidly, not



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Senior Analyst, Aviation Writers Assn.



Like many another up-to-the-minute company, Whitaker protects itself and its customers with microfilm.

The operation started some years back when a neighboring factory was razed by fire in the early morning darkness. The plant was totally destroyed, including every record, every piece of correspondence.

The shocked, water-soaked chaos, the mangled machinery represented not the big loss, but building equipment and furnishings were proved by insurance. But the nearby company was left in serious trouble without one scrap of paper covering its debts, agreements, promises, orders, permits and federal records, etc.

The tragedy brought home to Whitaker the urgent need for records protection, and a solution to the problem was found. A battery of microfilm cameras and readers was purchased and the recovery people immediately assigned to the task of photographing every available document—back to the company's inception.

If time or funds should ever run out of the vast treasure's photo today, not record, drawing or letter filed in Whitaker history—up to within two or three weeks—could be reproduced through the use of microfilm almost at once.

Right at the beginning of the program was the photograph of the large pile of post records accumulated over the years and packed away in a company warehouse section.

It took some three months of extra work to bring the program up to date—with the vast paperwork of the mounting department representing the largest single effort—then the 14-ton sequence was stored in a built-in Cup Creek road for safe keeping.

Safety they are stored in a special rack with temperature and humidity control in the desert recesses of Palo Verde, 120 miles distant, where an ordinary-sized cabinet holds the documentation that once filled a warehouse.

After the day-by-day worry of the past was safely on film, the area of aircraft papers was destroyed, and Whitaker embarked on a continuing program of microfilming covering

every division of the company.

For immediate protection it was decided to photograph every document, drawing, letter, even payroll list and time cards, as quickly as possible. Each department was made responsible for insuring against paper loss the loss of the documents used currently, and the time lag has been vital from one to three weeks, depending on the type of work of each department and the extent of microfilming needed.

Initially, there is no effort made to keep the exposed negatives in any special order. The various papers, promptly labeled but not yet ordered, are simply photographed in small increments over every week and placed in the vault for safety.

Then, once each post, the original records of the prior twelve months—now carefully ordered and filed—are again photographed in sequence, each document going under the camera for this sequence or one complete set of records can be preserved at the Palo Verde road while another is released for use in the plant after the original papers are destroyed. Following two years of change.

Microfilming of records is not required by the military services although in the past the USAF has asked for reproductions (X-ray type) of reports of terrain drawings, but also, except 35 mm. microfilm requires need to cover the larger sheets.

Whittaker has found that microfilming, conducted on a systematic basis, takes little time and requires negligible expense over the normal equipment and necessary "readers" (devices for reading negatives without actual reproduction) are purchased.

While protection for both the company and Whitaker's customers was the main objective, saving savings in space were realized as an unexpected additional benefit of the microfilming process.

The "Hercules" of hoses flies with the Lockheed Hercules



Powerful is the word for Lockheed's C-130 Hercules... with its long range and capacity for tough assignments.

"Herculean" strength and endurance also characterize the Fluoroflex-T hose assemblies that convey fuel and oil on this plane and on its four turboprop engines.

Fluoroflex-T R3600 hose assemblies represent the latest word in aircraft hose progress. They're 500°F lines. These are the only assemblies using a tube compounded from Teflon that have A-N approval for synthetic fuels, oils and nitric acid.

Get the facts—send for Bulletin FH-3

Fluoroflex is a fluoropolymer reinforced trade name for products from Fluoroflex Systems Division in the DuPont National Scale works for low temperature systems.

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Airwork, Pratt & Whitney Push Hi-Per DC-3 As Executive Plane

By George L. Christian

Modeling. N. J.—The Aircraft Corporation and Pratt & Whitney Aircraft, encouraged by the performance of the Hi-Per DC-3, are pushing the R2000 powered transport in a light, two-engine executive plane. The aircraft will cruise at well over 300 mph and have greatly improved angle of attack and high altitude take-off performance over standard DC-3s.

At Aircraft's Eugene Operations and Manufacturing Forum held in conjunction with FAWA, a Hi-Per DC-3 pilot produced the plane's actual performance figures to back up the company's claims of how much better an aircraft is Hi-Per as compared with the conventional old work horse. The figures carried over because he also flew an R1033 92-powered DC-3, giving him an accurate yard stick for performance comparison.

While R. E. Sheriff, chief pilot of Thompson Products, Inc., listed the Hi-Per DC-3's performance figures, the plane itself was parked on the apron of Aircraft's airport for all to inspect closely.

Apart from the R2000 7323 power plant, light-weight Hamilton Standard propellers and other improvements are limited to the Hi-Per DC-3 configuration.

The Thompson plane also includes power wheel self doors and short exhaust stacks. Sheriff commented that the doors add about 5 mph to the plane's speed, while the short stacks increase 40 hp per engine all its weight. They also do much to reduce vibration near the engine, as no longer attached to the airframe except by ductwork mounts. Personally, I can confirm between tail pipe and nacelle transmitted engine vibration to the plane's structure.

Conversion Cost

Sheriff told American West that his company was so satisfied with the Hi-Per's performance that it had authorized the modification of a second DC-3 to the Hi-Per R2000 configuration as soon as it comes up for engine change.

The engine was bought from Aircraft, while the actual modification is performed by Pin American World Aircraft in Miami. Total cost of the conversion is between \$50,000 and \$100,000.

The Thompson pilot stressed the fact that after over 400 h of operation, the engine had functioned perfectly without a single squeak. Chief Hi-Per features stressed by Sheriff:

- **Modifications** have boosted cruise speeds from 175-190 mph to 210-215 mph.
- **Engine power** is one of engine failure during take-off at maximum gross weight. With the 92, the situation can be critical. With the R2000, the plane will climb out with a prop windmilling—"no event at all," is quote Sheriff.
- **Fuel consumption** drops from about 100 gph to approximately 115 gph, but the increased speed gives the Hi-Per a slightly greater range. (Fuel consumption figures are average and include warm-up, taxi, off, climb, cruise and let down.)

Sheriff was that fuel consumption problems which caused when the engine were first installed have been solved.

• **Prop vibration** has been eliminated by balancing the motor dynamically.

Commenting on the "dies shift" down, Sheriff said that in effect, they allow the plane to cruise at the same speed with 650 hp less each engine as it did at 730 hp per engine before the doors were installed.

The net effect is to increase range and reduce wear and tear on the power plants.

An added bonus is the fact that the main gear struts reach between eight seconds as compared with 21 seconds—increasing safety by cutting drag quickly in case of a ground-out.

Wright and FAWA

Aircraft highlight of the conference was the announcement by Cessna Aircraft and Pratt & Whitney that they were going into the manufacture of a Wright Aero engine—the R1033 since the Cessna Aero has bought the Cessna 839 which mounts the engine. The plane is being built in Canada by de Havilland.

The Canadian government wanted to build its own engine to avoid having to depend on a foreign design. Cessna R2000 is the only manufacturer of piston engines in Canada. Remit the firm in building Wright powerplants.

In connection at this time was a joint discussion by representatives of



R-2000 ENGINE in Thompson Product Hi-Per DC-3. (1) shows door exhaust stack, (2) "thin shell" doors.

the division of Bendix Aviation Corporation concerning their various products. Divisions represented were Bendix Fuel Stack, Bendix Radio, Bendix Radio Products, Bendix Propeller and Bendix Division.

New facilities

J. S. Gillespie, Aircraft's vice president, outlined some of the new facilities his firm has established since the war. He said that the new facilities are in Newark, N. J., and other in Athens, Ga.

To improve the quality and scope of its work, the company has added 557,000 worth of new machinery. Included are short peeling facilities to check gluing bond, new cylinder bore honing machine, universal milling machine and several new lathe stands.

The success of the company can be judged by the increase in attendance in 1955 over 1954. The guests increased from 115 to 171 and the number of companies represented jumped from 99 to 101.

Southwest Fills Quota

Southwest Airlines Co. delivered its full July quota of overbooked 331 jet segments to the Air Force. It was the first segment in a contract involving more than 1,200 passengers and worth about \$1 million. The Dallas overbook agency built additions to its facilities, erected jet engine test cells, trained personnel and had its production lines rolling in 1955 alone to make the initial delivery.



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Back mounting for Type 5110 mounting outboard is designed to permit use of the outboard as ground-side installation as well as a front installation in permanent installation. The entire outboard fits forward from the back as a special design, permitting removal of the second engine without taking the outboard from the back. The new mount is constructed of 90% in steel stock and measures 12 in deep by 18 in wide for insertion in a standard vertical cut. Its features include 35 at 50 ohm, lower frequency response from 0 to 3,000 cps, second speed from 0.1 to 100 m/sec. during lines, tape identifier, reference trace—Consolidated Engineering Corp., 908 N. Street, Madison, Wis., Pasadena, Calif.

"Walker" skidder track, designed for hauling rails with weighing up to 18,000 lb, also available in capacities to 18,000 lb. Maximum rail diameter which can be handled is 90 in. maximum is 36 in. Maximum rail width is 65 in. Track operates with the handle in any position—including vertical and where rails of varying diameter must be handled—Lew Shepard Products, Inc., Dept. K-25, Watertown, Mass.

Type 44 vacuum, weighing 8 lb., is supplied in a portable unit for laboratory use or as a pump-out unit for use on other new or existing test equipment. Includes thermocouple, flux, filter cartridges and AN outlet fittings. 1/2 in. valve design employed in the instrument makes possible installation within 1% of indicated accuracy at any point of the scale. Ranges are 5 to 10 and 14 to 50 centimeters permitting use for measurement of all liquid and in testing aircraft fuel and hydraulic system components—Consolidated Research Laboratories, Inc., 70 Bedford Ave., Detroit 5, Mich.

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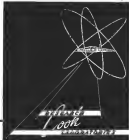
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Prospect is that 65% of domestic trunkline business will be sold in the low rate category within a few years.

By Katherine Johnson

Washington, D. C.—Flagline air coach business now accounts for more than \$190 million of the scheduled domestic carrier total \$1 billion-a-year business.

The coach volume of the trunk lines was \$154 million for the year ended last June 30. It was \$207 million for the calendar year.

One carrier—Eastern Air Lines—has a definite coach traffic goal: 65% of total business. The prospect is that in a few years that will be the coach percentage throughout the industry. Coach now amounts to about 44% of Eastern's total business.

The attitude of the industry toward coach carrier from the aggressive approach of Eastern and Trans World Airlines, in particular, to the cautious approach of United Air Lines and American Airlines whose coach services appear to be dictated by considerable restraint, by cooperative necessity.

The three areas of greatest competition in trunkline service are also the areas in which the growth of air coach has been particularly notable.

East Coast

The stiff competition is presently

between Eastern and National Airlines for the New York-Albany traffic. The number of coach passengers carried by Eastern for the year ended June 30 was over 1 million more than for the previous year. The number of National coach passengers increased by 122,000. But—coach business: 57% of National's total domestic business—in revenue, passenger miles—is in coach service for the last year. More than 45% of Eastern's revenue passenger flow coach.

West Coast

United Air Lines—despite the two-wheel opposition of its President W. A. Patterson to coach travel—a giant all-out with coach services, operating six coach flights daily over the Los Angeles-San Francisco-San Francisco route, and even using 747-100 airplanes in all hours. This is United's answer to the aggressive policy of Western Air Lines and the additional competition of non-scheduled and extra-city carriers in the area.

Transcontinental

TWA is emphasizing low cost coach service. The major current fight is between TWA's coach flights and the linen service of the DC-7s of United

and American Airlines. So far, the DC-7s appear to be holding a substantial part of the transcontinental business. Flight customers continue to pay \$158 for money transcontinental service. Now, that is the new reduced fare of \$80, initiated by TWA, is low than to coach service.

Two Carrier Decline

Civil Aeronautics Board's approval of TWA's plan for "combinations" service—coach and first class passengers on the same flight—means another step, and maybe, factor in the competition for transcontinental traffic. American openly opposed the TWA plan in its petition to CAB. United also was opposed but did not file a petition. But casualties of both carriers are already considering abandoning their opposition and suggesting similar "combination" service.

"It may not be a question of what we want and what we believe is right," an American official commented. "It may be a matter of what we have to do to avoid competition."

American's concern with the transcontinental market just about \$80 more for money but even opening some destinations, a result in a sag of traffic on the same airplane.

The coach business of only two domestic trunklines shows a decline—Capital Airlines and Colonial Airlines. Although Capital was a pioneer in

Coach Traffic for Domestic Trunklines

	Revenue Passengers			Revenue Passenger Miles (200 Millions)			Load Factor Percentage	
	Year Ended June 30, 1954	Year Ended June 30, 1955	Percentage of Total Scheduled Business	Year Ended June 30, 1954	Year Ended June 30, 1955	Percentage of Total Scheduled Business	Year Ended June 30, 1954	Year Ended June 30, 1955
	Year Ended June 30, 1954	Year Ended June 30, 1955	Percentage of Total Scheduled Business	Year Ended June 30, 1954	Year Ended June 30, 1955	Percentage of Total Scheduled Business	Year Ended June 30, 1954	Year Ended June 30, 1955
Total World	891,985	1,214,752	23.67	1,790,212	3,420,212	39.69	70	71
United	714,300	1,036,305	19.71	688,918	988,560	57.73	71	73
Eastern	638,608	1,315,495	27.58	579,463	1,315,773	49.85	76	67
American	516,315	588,671	11.53	765,683	916,877	51.87	76	73
Norfolk	348,978	491,437	10.20	375,261	495,185	50.35	79	68
Northwest	315,395	328,474	6.76	299,474	290,627	37.22	64	61
Capital	307,806	278,700	11.14	148,434	131,264	16.90	56	57
Western	303,680	323,688	3.38	154,409	163,825	35.25	61	63
Delta	196,725	215,483	5.34	137,621	234,396	56.09	68	69
Colonial	75,369	85,358	4.13	7,160	7,517	1.51	61	67
Bozell		45,482	2.92		25,781	4.40	61	70
Continental		*			18,681	9.14	60	60

* Not available

coach business, the short-haul sector is not well suited to this type service. A string of \$5 to \$10 a flight is not a great inducement. Capital has driven toward daylight flights. This resulted in a decline for the year ended June 30 of 28,000 revenue coach passengers (11,349,000 revenue coach mileage) below the previous year. The carrier plans to return its present coach pattern. In addition, company executives are now offering the possibility of new coach flights over New York directly from CAB between New York-Jackson, Detroit, Chicago.

Coleman's decline in coach business is largely due to less modern equipment (DC-6) compared with its competitors. For this year ended June 30, Coleman's air coach business dropped by 18.4% revenue passengers and by 2,768,800 revenue passenger miles below the previous year.

Promotion Continues

The scheduled airline—despite its relatively late start—promotes its competition—air promoting and plans to continue promoting low-fare air coach. But there is great concern that such a simple fact-based approach to a fare war on low cost level. Many industry officials complain that the difference between first class and coach is an unacceptably pretentious view of the rate differential.

The possibility of "last" type service (without reservations) to more clearly define the difference between first class and coach service has been discussed for several years, but still appears to have little favorable industry reception with the public acceptance of American. Company officials say that the increased cost of making reservations is minor, and does not balance the disadvantages of the "no reservation" policy, particularly consumer confusion. The airline is now to call fares for a one hour flight. Capital started its coach service seven years ago on a "last" basis. Competition from other carriers, offering the same type coach service on a reservation basis, forced Capital to follow suit.

Revenue Gains

Here is the dollar volume statistics of the airline from coach business between the year ended June 30, 1955 (first full year the previous year):

- TWA: \$60.1 million, compared with \$52 million, an increase of \$7.9 million.
- United: \$41.5 million, compared with \$29.4 million, a \$12.1 million increase.
- Eastern: \$27.3 million, compared with \$23.9 million, an increase of \$3.4 million.
- American: \$18.5 million, compared with \$20.4 million, an increase of \$1.9 million.
- National: \$19.2 million, compared

with \$15 million, an increase of \$4.2 million.

- Northwest: \$12.2 million, for both years.
- Western: \$6.9 million, compared with \$5.2 million, an increase of \$1.7 million.
- Delta: \$9.4 million, compared with \$5.8 million, an increase of \$3.6 million.

Revenue Losses

Capital's coach revenue dropped from \$6 million for the year ended June 30, 1954 to \$5.5 million for the following year.

Coleman's revenue dropped from \$479,362 to \$325,420.

Bonair Airways' domestic coach revenue was \$1 million for the year ended June 30. Continental Airlines was \$754,002. These two carriers ran, not in coach operations for the full year as yet.

Here are observations on coach in individual carriers:

• **TWA** expects to convert its "One-dollars" to "one-dollar" service promptly—"in matter of hours." Officials at the company anticipate that in a few years there will be an "air" coach, that what today is "coach" will become "standard" air service, supplemented by a relatively marginal amount of "luxury" service, offering such advantages in deposits or perks, hotels.

• **American** officials say they will push coach service "while still keeping our feet on the ground." American will probably increase its coach flights next year.

• **Eastern** expects its planned development of coach business over the past year to increased sales volume and first class expansion—DC-7s and C-54s.

Company officials say that the company's aggressive policy in coach has been 65% of total business in coach. Eastern's response to the demand of the public for more first class service. One example of Eastern's sales effort was a coach flight for 10,000 miles, to which a coach passenger paid \$1.00. A survey showed that 21,000 had never before paid a cent in air fare. In the past Eastern also had an eye on the long range intercity, based on generating transatlantic demand and sales.

• **United** will put out schedules with first class in a few weeks, with coach on an equal basis. The company predicts that coach will account for 15% of its total business in 1955, compared with 20% in 1954. United plans a major effort in its coach in 1956 and 1957. When 30 new four-engine aircraft are delivered in these years the company anticipates conversion of its DC-6s to coach.

Independents Hit Air France Subsidies

Paris-Air subsidies for three private-owned French airlines recently charged that government aid to the troubled Air France in the last few years has paralyzed the carrier in its own industry by 40%, while the independents suffered a 25% loss.

The complaint came in rebuttal to an report later addressed to all members of the French National Assembly by trade members of various bodies with Air France, accusing the government of favoring private airlines in French Union operations. Last year Air France's profits as the French Union carrier and its loss offset half the losses in civilian international operations. During the year Air France lost more than \$5 million before taking account of direct government aid.

The private carriers say that Air France has received \$140 million in subsidies since 1947 in the form of subsidies or government-guaranteed loans.

Italy Will Expand Airline Operations

Rome—The Italian government plans to expand approximately 52.6 million expanding domestic and international airline services during the next three years. The money will be divided evenly between Alitalia and Alitalia.

Alitalia, the state airline, is the "approved" carrier in Southern Italy and to expand on lower fares to encourage increased traffic. Rome will run depending upon the economic state of the country. An increase in traffic will result in reduction of its subsidy.

Alitalia will be encouraged to develop international service to the Far East and Australia and from Rome to Sicily and South Africa.

American Protests

American Airlines has protested to the Civil Aeronautics Board that a new regulation on transatlantic routes would harm the carrier's business. The carrier is a member of the United Air Lines "club" which would be "clearly unfair."

American's complaint states: "The fact is, the United would provide emergency backup should any of its flights with 15% discounts on both the air transportation provided by United and the automobile rental service but only if both services are used."

American claims that "ground trip" procedures involving such agreements would be paying more for an ordinary round trip ticket than they would if in addition to the round trip ticket they obtained the town automobile rental.



For the fielding, pilot study with instruction.

Cessna T-37... Designed for Jet Training

Side-by-side seating is a unique feature of the new T-37 being developed for the Air Force by CESSNA. It is one of many features which make it most for cockpit-pilot to change from prop-driven to jet airplanes.

In the T-37 a flight instructor is literally the pilot's right-hand man. As a result, the student gets the benefit of close, personal instruction. This side-by-side seating makes an important contribution to the overall

mission of the new trainer by permitting smoother, safer transition to jet in other stages of pilot training. This, in turn, reduces training time and costs.

CESSNA, awarded the responsibility of developing an airplane to meet these requirements, is proud to be a partner with the Air Force in jet age planning.

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WICHITA, KANSAS



SPEEDY NEW

TURBOPROP

DROPS 'EM EASY

READY FOR ACTION

USAF HERCULES

All the features of the Turboprop Air Command have one thing in common: *agility*. Whether the dual, TAC, crew can carry it (see "That's who's who" in our story).

Support the call in four paratroops. USAF's new C-130 Hercules, built by Lockheed, is the dual paratroop transport. Look how the Hercules provides paratroop delivery.

It fully equipped paratroops can run ahead of the aircraft door. In minutes the Hercules is loaded.

Up over the ramp and, with turbo-prop power, the Hercules is airborne in seconds.

Flying lower than most commercial transports and with great range, the Hercules gets where the paratroops are needed in a hurry. Inside, each paratrooper has his own seat, 3 feet wide. The cabin is pressurized and air conditioned, pressurized in-flight landing.

Two special roll doors at the rear of the Hercules were designed for direct troop drop. An efficient windscreen deflector and a nose-to-rear circulation make paratroops drop easy, fast and safe.

USAF's Hercules is now in production at Lockheed Aircraft Plant No. 6 at Marietta, Ga., America's first big drop production line for its paratroops.

GEORGIA DIVISION
LOCKHEED
AIRCRAFT CORPORATION

Marietta, Georgia

Trunks Battle for New Routes In Final Round of Denver Case

Washington—Civil Aeronautics Board concluded the 11-month-old Denver Service Case with final arguments last week that produced no explosive final round.

American Airlines attacked both Trans World Airlines and United Airlines.

United then backed TWA and TWA struck back at both American and United. All three of the transcontinental carriers were accused of being "severe" of competition by the regional airlines.

The intensity of the airlines fighting in the Denver Service Case highlights the current struggle in the industry for new routes, a development that has occurred with the recent change in policy at CAB.

The Board is at present making new route awards after a long silence on route changes as a substitute for route expansion.

All of the airlines have not necessarily welcomed the Board's change in attitude. Commenting on the risk of new route applications and the Board's stated desire to make them through, United's president, W. A. Patterson, charged: "There is already an accumulation on the part of airlines to be low for CAB efforts to go in creating new routes and passing studies. In so many airlines are filing for new routes in order to maintain a balance of competition."

An equal amount of routes, however, will be paid out in subsidy by CAB to the same carrier (AW Sept 19, p 15).

Competition Release

"Certain airlines have filed applications into territory we service. In fact of how the Board we set in such as airplanes, we are forced to file into other territory to be sure we maintain a balance of competition."

"Finally, this explains our Florida application. In my opinion it is a difficult call to present any evidence of the case for the route."

United's major line of argument in the Denver case has been the company's desire for "protection." Attorney H. Troupman Brown claimed something must be done for United to "control" its quality of service. "He said United would sustain a diversion of \$21 million per year under the carrier's revenue reduction as the cost and from Board decisions already made in the New York Chicago case."

The only other available to United would be its operations at Kansas City and Pittsburgh, according to Brown.

The Board was urged to approve

United's application for service at both Kansas City and Pittsburgh. He said neither city was meeting the kind of an service it should and particularly asked TWA for "providing Kansas City with fewer transcontinental services than in 1947. Brown also asked the Board not to lift the restriction on American Airlines' transcontinental service out of the San Francisco Oakland line.

America's Views

American stressed the opposition to its requests for relief from restrictions at "which" again to present serious competition Howard C. Windward, American attorney, called on the Board to issue "ending" United and Trans World. He said the situation reflects a serious and indefinite competitive imbalance. American's application for the case is summarized with:

- Removal of the restriction on trans-

continental service to San Francisco Oakland.

- Certification for service at Denver.
- Permission to fly nonstop between Denver and Los Angeles.

Trans World, in turn, strongly objected to further narrowing American's route, claiming that unrestricted rights at San Francisco would make that carrier's business of more than 1,000 wholly new route sales. TWA counsel James K. Grossman urged the Board to give first consideration to TWA's application for Denver service—the basis for the entire case and support all other applications.

"Actually, American and United are primarily using the proceeding as a 'subsidy' for the subsidy" he declared, and criticism completely unrelated to the needs of Denver," he declared.

The Board was asked to recognize the existing deficiencies in Denver service, which Grossman attributed to "United's cost-cutting measures."

He charged TWA is best suited to meet Denver's urgent need of long-haul service particularly in the air-cargo field.

CAB Proposes Feeder Mail Rate

Civil Aeronautics Board proposed a multi-element service and rate structure for the 15 local service air carriers last week which will result in an annual saving to the Post Office Department of \$3,570,000.

An equal amount of routes, however, will be paid out in subsidy by CAB to the same carrier (AW Sept 19, p 15).

The changes in the local industry's rates, pay scales are based on those made recently by the domestic trunk airlines.

CAB estimated that the domestic structure proposed for the local lines will produce an average yield of \$1.95

per mail ton-mile compared to the current average of \$1.35.

The two-part rate will consist of a local-mail charge of 50.17 cents per mail ton-mile plus a terminal charge per pound of mail explained ranging from 1.73 cents to 31.75 cents varying by class of service.

Annual total service mail pay for the local service industry under the newly current structure will be approximately \$4,815,000. This is a reduction of \$3,570,000 from \$1,146,000 in service mail pay under present rates.

The additional rates per mail ton-mile proposed for the 15 local air carriers for local mail to be for the period July 1, 1955 through Sept 30, 1955.

The local compensation for each carrier after Oct 1 will be paid monthly after comparing the sum of the local-mail charges and the terminal charges.

Therefore the Board's estimated total per mail ton-mile will immediately change. Major changes will be necessary by route adjustments and airport charges and in some cases an arbitrary application of a terminal rate. A new airport service will require a reorganization of routes and a corresponding change in the local-mail charges.

Any system that is not specifically classified by the Board will automatically fall under the terminal rate of 8.95 cents per pound.

Mail Rates		
Carrier	Estimated Yield per Mail Ton Mile	1954-55 Costs
Allegany	134.20	Costs
Alouette	97.16	
Central	106.94	
Frontier	75.78	
Lake Central	176.40	
Midwest	80.46	
North Central	161.60	
Omaha	124.69	
Piedmont	61.31	
Southwest	99.14	
Transwest	121.21	
West Coast	124.86	
Average	104.75	Costs



Frye Short Takeoff Transport Ready to Leave Drawing Board

The Frye F-1 large-capacity, low engine transport being tailored as a "DC-5 replacement" is taking on final design-board form while its owners work for a contractor to manufacture the aircraft and, as expected, for future contractors.

Final wind tunnel tests are being conducted at the University of Wichita to work out the best possible nose configuration, and production construction is scheduled to begin next spring. Concurrently, the newly-founded Frye Corp. in Fort Worth, Tex., is receiving inquiries from both foreign and U.S. airlines and U.S. local service carriers.

Jack Frye, company head and former Trans World Airlines president, told Aviation Week that for freedom in following the project closely, Frye plans to confer with officials of these airlines and others to work out a standard configuration for the F-1 for final design.

The company also proposes to offer the new plane, in military service as an "all threshold" base, Frye said.

At present the company has placed a \$190,000 price tag on the F-1.

Contract Production

The photograph of a model (above) depicts an early version of the F-1. A more accurate configuration gives the airplane a slanted fuselage and, including a nose overhang, a strong box-like to ease cargo loading. The cockpit also has been moved forward for better visibility. The landing gear will have a single nose strut coming down from the reinforced engine nacelle and connecting with struts running out from the lower fuselage.

Frye Corp. expects to start construction of a mockup as soon as it can locate facilities. Those to its present offices at 5115 Tenth St., 21 Words.

The firm plans to stick to engineering and development, with F-1 production contracted to an outside company. Frye explained that the new firm does

not want to deplete both capital and time through the building manufacturing facilities when there is considerable production capability available as a result of this country's military buildup.

He reported that negotiations have been under way for some time with a number of aircraft manufacturing facilities but that no final decision has been made. The airplane will be produced under one roof, he said, and the contractor responsible for producing and assembling the plane.

The F-1 may also be produced in Europe and possibly, Latin America, as the company's own facilities, by arrangement with an existing manufacturer or by lease. Frye said that the firm is now discussing the possibility with firms in two European countries.

Easy profitability, assembly and maintenance will be factors in the place, with all engine structures designed to operate without replacement for 30,000 flying hours and 15 years' continuous service. The low nose behind the fuselage is Frye's first real break. Karl H. Weil, who figured significantly in the design of the rugged F-105, is senior transport and operated an F-105 during the Middle East before coming to the U.S.

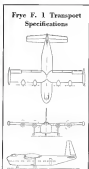
Weil's main job has been not in watching the F-1's design and production as it matures rapidly. One environmental restraint will be met.

A number of engineering manufacturers have been called on to develop components for the F-1, to develop gear manufacturers are working out design on a competitive basis.

Short-Field Flying

The Frye F-1 is not designed for beauty or speed-it's mass purpose is to take 3,000 to 10,000 lb payloads off the ground in less than 1,000 ft at a takeoff speed of less than 15 mph and then carry it some 250 mi.

It was initially designed for use in austere, closed world areas where road and air transportation facilities were at



Wing span	89 ft.
Wing area	1,519 sq. ft.
Length	55 ft. 4 in.
Wing height	34 ft. 6 in.
Cargo door loading height	52 in.
Nose cargo door	7 ft. x 12 ft.
Side cargo door	7 ft. x 8 ft.
Normal gross weight	34,000 lb.
Maximum rate	50 ft/sec
Unaccelerated	
altitude	60 ft. x 30 ft. x 5 ft.
usable cargo area	3,600 cu. ft.
Wing loading	22 lb./sq. ft.
Maximum speed	170 mph
Cruise speed	110 mph
Maximum speed (at normal gross)	51 mph.
Service ceiling (two engines)	20,000 ft.
Normal cruise altitude	12,000 ft.
Landing distance over 50 ft. obstacle	900 ft.
Takeoff distance over 50 ft. obstacle	900 ft.
Performance:	
Power (600 hp) PA/Wo NINE-G Wing	
Price	approx. \$190,000

a minimum. Frye emphasized that the F-1 is not intended to be competitive to another, more sophisticated "DC-5 replacement" the new Hercules F-105, which features a pressurized cabin, retractable landing gear and a 300 mph cruise speed to 50% power.

"In fact," he said, "we have sold some potential customers that they would be better off if they took a look at the Hercules, because we feel it will

out there better than we F-1."

Frye said he feels that the basic F-1 has considerable design "stretch" so that further performance gains can be built as at a later date. The company has been evaluating a number of helicopter powerplants in the 500-hp class, he said, which will give the F-1 a cruise speed of about 170 mph and top speed of 195 mph and cut takeoff distance over a 50 ft. obstacle to about 900 ft. Boundary layer control is another possibly useful study.

Approach is fine because has been made on a water-based runway. Frye said that the F-1's operating costs will be so low that an operator would be better off looking out the necessary airways rather than getting on expensive flights. Frye said that he would rather go to low-level type landing gear than conventional gear arrangement.

Frye's Structure

Frye Corp., organized some six months ago, is a privately financed group. In addition to Jack Frye and Karl Weil, other firm members are:

Cory W. Vines, former president of Cavalier-Wright Corp.; Robert Haller, of Robert Heller Associates, a Cleveland industrial engineering and consulting firm; A. William Moore III, partner in Moore Reels Co., Granite City, Ill.; John D. Murfrees, Dallas, Tex.; and Perry B. Ross and Francis H. McKillop, both of Ft. Worth.

The chief engineer is William R. Smith, formerly of McDonnell Aircraft Corp. Other associates include Capt. D. W. Tinsdale IV (USN), former TWA vice president-engineering and deputy commander of the Berlin Airlift; Capt. William S. Dahl (USN), who inspired its airplane design and research and applied aerodynamics; and Dr. J. M. Franklin, aircraft structural specialist.



NEW YORK'S 33-MILLION Dyer Airline Terminal opened this month, offering relief for Newark-bound passengers who formerly left by bus from the East Side Terminal only to find themselves caught in traffic jams that sometimes required up to an hour to negotiate. New buses also decelerate into Lincoln Tunnel.

Erratic Approach Blamed in Crash

Probable cause of the crash of a Learjet 35A on Dec. 18, 1954, was an erratic approach, which resulted in a descent to an altitude too low in several instances, a report which reported the left wing of slope line approach lights, the Civil Aeronautics Board reported last week.

Pilot fatigue due to the particular and difficult circumstances was a contributing factor, the Board said. The crash one of five and 16 of the 22 passengers were killed.

The flight from Rome to New York was uneventful and the aircraft reported to liftoff tower and was cleared to enter a holding pattern located about 15 nautical miles from the airport and was "informed down" to the number one position to approach. Weather conditions deteriorated below the ceiling maximum of 480 ft and the flight continued to hold.

Weather conditions improved and the flight was cleared for an approach to Runway 4, conducting the initial approach. The flight approach and entered its approach and then advised the tower that the approach had been made. The flight then attempted a go-around, a second approach, which occurred, and returned to the holding pattern again.

The flight was again cleared for an approach and then advised the flight would be able to make an approach to Runway 4, conducting the initial approach. The flight approach and entered its approach and then advised the tower that the approach had been made. The flight then attempted a go-around, a second approach, which occurred, and returned to the holding pattern again.

The flight was again cleared for an

ILS approach to Runway 4. This was the third approach to this runway and fourth to the airport. It was on this approach that the DC-5 struck the pier. Crashing at the base of the crash was 200 ft with a visibility of 24 miles. Approximately 80% of the aircraft was involved and the examination disclosed an evidence of fatigue cracking, structural failure or malfunctioning controls.

The report stated: During the Board's investigation and analysis of this accident, careful consideration was given the possible misinterpretation of the approach lights or an illusion associated with them. In addition regarding misinterpretation or illusion would be primarily the testimony of the crew. This was not available for consideration, the entire crew being fatally injured. The Board recognized these as possible factors, however, from all the available evidence, the Board was unable to determine whether or not the lights were a factor.

In its official report, CAB noted that a discussion of approach light misinterpretation was carried on Aviation Week Jan. 31, Feb. 21 and Apr. 31.

National Plane Denied

National Airlines has not a severe to the Supreme Court to block an Eastern Air Lines-Colonial Airlines merger following a federal last week by the U.S. District Court of Appeals of National's plea for a stay of the proposed steps in the Eastern-Colonial merger case.

The appeals court also denied a National petition for review of Civil Aeronautics Board action limiting its role in the merger case.



At present, the temporary building houses the facilities of Swiss Air, Swissair-Alpine, American, Eastern, Mohawk, National, United and Trans World. Northwest Orient is scheduled to move in as the new terminal. The building itself is located between Tenth and Dyer Avenues with its own entrance on Third St.

Management Challenge

Admiral Arthur W. Radford, chairman of the Joint Chiefs of Staff, is the latest top American official to warn of the increasing gravity of our technological race with Russia in developing new weapons (see page 15). The increasing pressure of the race is evident in the changing pattern of research, development and procurement of aerial weapons systems reported in recent issues of *Aviation Week*. The military are making increasing demands on the aviation industry and its supporting structure to develop equipment faster, produce it cheaper and deliver it sooner.

Successful operations in this newly evolving development and procurement system pose new and tougher challenges to the management of aerospace, avionics and component manufacturing firms. For the large industrial giant in the machine business, the task of weapon system manager will provide a new barometer to success or failure. For the sub-system and component manufacturers, heavier emphasis on development and new relations with the weapon system manager will impose heavier loads.

Competition is getting stiffer with better rewards for the successful and less pickings for those organizations that lag in development in production performance.

There is going to be increased pressure from the military to persuade industry to invest larger portions of its profits in research and development facilities and efforts to push the state of the art ahead at a much faster pace.

There is going to be less room along of technically troubled production programs and more hard-boiled sifting out of products that don't fulfill a manufacturer's promise.

There are going to be major shifts in the financial fortunes of individual companies depending on how well they adjust to the changing picture.

In the face of a wide variety of pressures from the military, customer, our industry must develop a strong independent voice of its own, capable of exerting effective counter-pressure against unsound and restrictive government policies. Unless the industry develops effective spokesmen and sound techniques to support its case, it can easily be swamped by a rising tide of political and military bureaucracy in the weapon business.

Never before has management of the aviation industry faced such a difficult challenge. Never before has it had a better opportunity to serve the interests of the country better.

Keep the Sabre Knights

An Air Force team has made a grave mistake in disbarring its Sabre Knight jet acrobatic team from the 37th Fighter Interceptor Squadron at Hamilton AFB, Calif. Apparently USAF feels that one jet acrobatic team is sufficient to represent it publicly and has picked the Thunderbolts as its official stunt group. We strongly disagree with this policy.

USAF feels needs public support not only generally for its entire program but also specifically from the youth of the nation from whom it must draw its future pilots, air crew, missile technicians and all of the high grade human skills that it takes to train weapons and material into a top notch fighting force.

Jet acrobatic exhibitions conducted with the precision, skill and safety that have characterized the operations of the Sabre Knights Thunderbolts and the Navy's Blue Angels are a dramatic method of stirring public interest in general and the specific interest of young men in their country's aerospace. USAF needs more jet acrobatic teams, not less. It should reverse this shortsighted policy and reorganize the Sabre Knights.

British Misinformation Service

Here is a little gem of astronomical misinformation just received from the British Information Service, an official agency of the British government. Its press service bulletin P-4299 dated Sept. 30, 1955 and marked for the attention of aviation writers, this official propaganda agency says:

"Britain's Engine in World Speed Record One of Several Made Under License in the United States."

This release goes on to "inform" aviation writers as follows: "The USAF Super Sabre's magnificent feat of flying an average of 822 mph to gain the world speed record is a shining commendable satisfaction to British aircraft manufacturers."

Beside their natural pleasure at the success of a friend they are also cheerfully reminding each other that the P100C engine is the famous British Sapphire made under license in the United States by Pratt & Whitney as the J57 and by Curtiss-Wright as the J65.

This release goes on to "inform" aviation writers that the Bristol Oblique "developed to produce 15,000 hp. thrust is also being made by Pratt & Whitney as the J57 and by Curtiss-Wright as the J65."

As U.S. aviation writers and British aircraft manufacturers know, the J57 engine is strictly an American product designed, developed and built by Pratt & Whitney Aircraft. The only license involved in the J57 is that issued by Pratt & Whitney to the Ford Aircraft Engine Division in Chicago to augment production to meet the tremendous USAF and Navy demand for this turbojet. U.S. aviation writers and British aircraft manufacturers also know that the design data on the Bristol Oblique has been loaned to Curtiss-Wright, not Pratt & Whitney, for development of the J67 turbojet.

British aircraft manufacturers must also be "cheerfully reminding each other" that this type of astronomical publicity peddled abroad by an official British government agency does them irreparable harm. Their "natural pleasure at the success of a friend" must be tempered by the conviction that they need a new aviation writer in the British Information Service. —Robert Holt

2 In other colors, hovering planes were lost in "no echo" clutter appeared due to its on scope

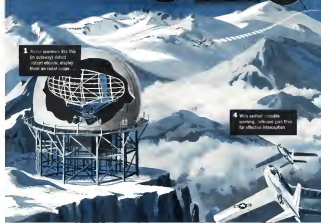


3 This radar has power to eliminate all but moving objects. Low flying planes appear on scope like this



1 Radar searches like this in outwardly direct current electric, drawing from an radar scope

4 With neither visible warning, defense can find for effective interception



NEW POWER SOURCE TIGHTENS RADAR DEFENSES

Miles/Watt Klystrons Aid Detection of Distant, Low-Flying Planes

THE STORY BEHIND THE STORY

What is the significance of the headline above? To borrow from an old baseball expression, "You can't see us if you can't see us" —apparently planes that formerly could radar detection are now be "seen" at greater distances than ever before.

Behind this improved radar vision is a new family of high power tubes known as Megawatt Klystrons. These new tubes not only provide greater ability for lowering radar antennas against small and distant objects, but provide a new

improvement to a technique known as M.T.I. or Moving Target Indication. In radar without M.T.I. everything within the beam of the radar appears on the moving scope images from trees, terrain, buildings, all combine to form "ground clutter" on the scope. M.T.I. eliminates this "ground clutter" by indicating moving objects only. Therefore with Megawatt Klystrons, approaching aircraft can be spotted sooner and defenses can be alerted more quickly.

Producing millions of watts of electronic power, these giant tubes make possible illumination of small objects

with radar antennas at greater distances to provide clear, sharp images on the radar scope. Furthermore, the Megawatt Klystron's stable performance and long life assure that these radar systems are constantly on guard.

The Klystron tube made microwave radar possible. Developed by Sperry, it generates, amplifies in multiples microwave. Today Sperry produces Klystrons covering a wide range of power and frequencies for specific requirements — both military and industrial. To meet demands for three tubes, a new plant has just been opened devoted exclusively to Klystron research and production.

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